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How Can the Use of Human Enhancement (HE) Technologies in the Military Be Ethically Assessed?

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By

Philip Andrew Taraska

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ABSTRACT

HOW CAN THE USE OF HUMAN ENHANCEMENT (HE) TECHNOLOGIES IN THE MILITARY BE ETHICALLY ASSESSED?

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War is a terrible price to pay for the prospect of peace. Yet every nation has a moral obligation to protect its citizenry from unjust aggression and threats to security. To be sure, war is always a failure. It is a failure of mankind to come together in mutual respect for the inherent dignity of the human person. The issue of the use of HE in the military is relevant today because the Global War on Terror (GWOT) and the rapid rise of emerging technologies have led to a never-before-seen type of asymmetrical warfare. The rise of these technologies can threaten the inherent dignity of the human person. In turn, the value that a nation places on human dignity in many ways is a gauge of what sorts of rights it will guarantee to its citizens, which impacts their ability to pursue basic human goods and contribute to the common good.

Military culture seeks to instill virtues, such as courage and justice, in soldiers and also uphold particular military values, such as honor and selfless service. These virtues and values

can be threatened if the use of HE in the military are used for immoral purposes. Paternalism, coercion, undue influence, and limited autonomy are all factors that can undermine the dignity of soldiers. Yet these threats can be overcome through a moral framework for how to ethically assess the use of HE in the military. The moral criteria of reversibility, upholding moral agency and military values, voluntary informed consent, and the use of non-HE technologies first (last resort) presented in this dissertation allows one to approach different HE technologies for use in the military and determine if they are compatible with human flourishing. It will be imperative that HE technologies in the military, if morally permissible, are used on a small-scale and only for necessity, not convenience. This approach is valuable because it can overcome demands put forth from the civilian realm that these HE technologies should be available to them as well; based upon philosophical claims of autonomy and individual rights.

This dissertation is distinct insofar that it provides a comprehensive approach to current and future ethical issues related to HE in the military. To strengthen and compliment this moral framework, some recommendations are put forth in this dissertation. These include greater transparency in HE research and use, the designation of soldiers as a vulnerable population, greater ethics education for military health care professionals, the codification of international principles and guidelines for the use of HE technologies in the military, and finally a recommendation to balance the overarching principles of autonomy and individualism with a communitarian ethic and common good approach as a beneficial way to assess the use of HE in the military.

DEDICATION

To my parents, the late Vincent + and Barbara Taraska, who from a young age instilled in me the values of hard work and dedication.

And

To my wife Rebecca, whose countenance during this process was divine in nature.

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First and foremost, I am thankful to my Lord Jesus Christ, who in union with the Father and Holy Spirit has provided abundant blessings throughout my life. Jesus, I trust in you.

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LIST OF ABBREVIATIONS

ACHRE:	Advisory Committee on Human Radiation Experiments
AHRPO:	Army Human Research Protections Office
AMA:	American Medical Association
AMEDD:	Army Medical Department
AR:	Army Regulation
ARCIC:	Army Capabilities Integration Center
ATE:	Anticipatory Technology Ethics
AugCog:	Augmented Cognition
AVIP:	Anthrax Vaccine Immunization Program
BMI:	Brain-Machine Interfaces
BOLD:	Blood Oxygen Level-Dependent
BT:	Botulinum Toxoid
BTWC:	Biological and Toxic Weapons Convention
C3G:	Crystalline Cellulose Conversion to Glucose
CDC:	Center for Disease Control
CE:	Cognitive Enhancements
CFR:	Code of Federal Regulation
CWC:	Chemical Weapons Convention
DARPA:	Defense Advanced Research Projects Agency
DoD:	Department of Defense
DSO:	Defense Science Office
EE:	Emotive Enhancements
ElectRx:	Electrical Prescriptions Program

ELSI:	Ethical, Legal, Social, and Policy Implications
fMRI:	functional Magnetic Resonance Imaging
FTCA:	Federal Tort Claims Act
GWOT:	Global War on Terror
HAND's:	Human Assisted Neural Devices
HE:	Human Enhancement
HET:	Human Enhancement Technologies
HORNET:	Human-aided Optical Recognition/Notification of Elusive Threats
HUMINT:	Human Intelligence
HVT's:	High Value Targets
ICMM:	International Committee for Military Medicine
IHL:	International Humanitarian Law
IRB's:	Institutional Review Boards
ISN:	Institute for Soldier Nanotechnology
ISR:	Intelligence, Surveillance, and Reconnaissance
IVN:	In Vivo Nanoplatforms
JWT:	Just War Theory
JWT-I:	Irregular JWT
LDRSHIP:	Loyalty, Duty, Respect, Selfless Service, Honor, Integrity, Personal Courage
LOAC:	Laws of Armed Conflict
LOAC IT:	Laws of Armed Conflict International Terrorism
LSD:	Lysergic Acid Diethylamide
MAD:	Mutually Assured Destruction
ME:	Moral Enhancement

MOS:	Military Occupational Specialties
NBIC:	Nanotechnology, Biotechnology, Information Technology, Cognitive Science
NCOER:	Non-Commissioned Officer Evaluation Report
NIS:	Neural Interface Systems
NSA:	National Security Agency
OER:	Officer Evaluation Report
PB:	Pyridostigmine Bromide
PE:	Physical Enhancements
PET:	Positron Emission Topography
PSD:	Preventing Sleep Deprivation
PTG:	Post-Traumatic Growth
Report:	Belmont Report
SSRI:	Selective Serotonin Reuptake Inhibitors
TAA:	Train, Advise, and Assist
TBI:	Traumatic Brain Injuries
tDCS:	Transcranial Direct Stimulation
TMS:	Transcranial Magnetic Stimulation
TNT:	Targeted Neuroplasticity Training
TRADOC:	Army Training and Doctrine Command's Future Warfare Division
UCMJ:	Uniform Code of Military Justice
UDBHR:	UNESCO Universal Declaration on Bioethics and Human Rights
UDHR:	Universal Declaration of Human Rights
UN:	United Nations
USAMRMC:	United States Army Medical Research and Materiel Command

USSOCOM:	United States Special Operations Command
USUHS:	Uniformed Services University of the Health Sciences
VA:	Veterans Affairs
WHO:	World Health Organization
WMA:	World Medical Association
WPR:	War Powers Resolution

Chapter One: Introduction

A. Human Enhancements in the Military

War is always a failure. It is a failure of nations to come together in mutual agreement to prevent bloodshed and upheaval. Ending and preventing all wars should always be a goal of humanity. Unfortunately, not all nations or third party actors see this as an appealing end state. War is often sought after and provoked. Warfare is a reality of this world. Moreover, warfare is often muddied with variables. General warfare sees nations pitted against each other and all resources devoted to that cause. Limited warfare is not as overt and embodies most of the violence seen in the world today. The term "war" is often softened for political purposes. Words such as conflict, struggle, dispute, or uprising are terms that the populace is more accustomed to hearing. Avoiding the term "war", however, makes it no less of a reality.

An indefinable amount of time, money, and resources are devoted to foreseeing, preventing, fighting, and recovering from war. For safety and security purposes, nations are always seeking any advantage they can get over their adversary. Often these advantages are technological. Weapons such as drones or precision guided missiles are touted as preventative and efficient in nature because they are intended to reduce innocent casualties. Tougher ballistic body armor and mine resistant vehicles are designed to protect soldiers from the kinetic strikes of war. With so much emphasis on the technological weapons of war, it is easy to overlook the fundamental player in war. The human person remains the single most influential factor in the outcome of war even when our frail human physiology is ill suited for the task. History has shown us there is more to war than mere weapons. As the United States Special Operations Command (USSOCOM) Truth #1 states, "Humans are more important than hardware. People –

not equipment – make the critical difference…..The best equipment in the world cannot compensate for a lack of the right people."[1]

Humans have the cognitive ability to reason "outside the box" which allows for flexibility, adaptation, and critical problem solving; all essential attributes for soldiers in war. The Global War on Terror (GWOT) has seen over 2.7 million U.S. soldiers deployed to Iraq and Afghanistan over the last 15 years.[2] Even though a soldier may be war tested and proven, numerous variables may preclude them from acting as such again in a battlefield environment. No accurate predictor exists for how individuals will react in warfare. Moreover, no predictor exists to determine if soldiers have the resiliency to overcome many of the non physical wounds of war. This is the "fog of war" that many authors have addressed in the history of humanity.[3] The emerging field of human enhancements (HE) and their application to the military seeks to overcome shortfalls in areas such as these both in wartime and in peacetime.

This dissertation adheres to a definition of HE as provided by Juengst. HE are medical or biological interventions introduced into the body designed "to improve performance, appearance, or capability besides what is necessary to achieve, sustain, or restore health."[4] Individuals and institutions have different concepts of health and disease.[5] The Army Medical Department's (AMEDD) motto for example is "To Conserve Fighting Strength". The application of this motto will necessarily nuance the approach to health depending on if it is wartime or peacetime. HE takes on a different meaning and application in the military. Most likely, they would primarily be used to gain the competitive edge and protect the nation from its adversaries in present and future conflicts. However, the use of HE in the military have potential to be used in a non-offensive environment as well, for example in the treatment of non-physical wounds sustained by soldiers.

Many questions and concerns emerge at this point. Cognitive enhancements (CE) might allow the soldier to erase painful memories and be more resilient to stressful situations on the battlefield. Physical enhancements (PE) might allow the soldier to recover faster or overcome fatigue for a greater period of time both in training or combat scenarios. Many HE technologies pose little to no moral dilemmas and are already being implemented in certain branches of the military. However, the possibilities, challenges, and unintended consequences of HE are endless. Their use and application shall be extensively discussed in the upcoming chapters. HE come from a variety of disciplines including pharmacology, genetics, neuroscience, biotechnology and nanotechnology. Many HE teeter on the edge of what is therapeutic versus enhancement and thus may encroach upon the fundamental nature of the human person.

If a goal of humanity is to eradicate war, then a transitory goal could be to alter war so that fewer lives are lost but a nation can still protect and preserve itself from adversarial threats. However, preparing for war based upon past experiences alone is insufficient. A nation must have a proactive and preventative strategy as well. Predicting what warfare might look like in 10 years is significantly different than predicting what it will look like in 50 years. Few if any leaders predicted the terrorist attacks of 9/11. Yet, its impact has forever altered humanity and the approach to warfare. The purposes for which HE could be used in the military ultimately depend on the needs and expectations of future military conflicts. Scientific and government leaders should be in constant dialogue as to what HE are realistic and necessary. Thus, research has a fundamental role to play in whether or not HE will be used for moral or immoral purposes.

Predicting what warfare will look like is an ever-changing task. New alliances are created, new threats emerge, and unforeseen acts of violence and terrorism will occur. All of these actions will require a shifting or a nuance of current policy. A proactive and preventative

approach seems most prudent. What this may entail is a nation being forced into having the HE technology tested and in place should the need arise to implement it. The example of the Mutually Assured Destruction (MAD) policy of deterrence during the Cold War is on point here. The buildup of such a large arsenal bordered on madness at times. Had the policy been implemented, countless lives would have been lost, perhaps humanity as we know it. Controversial HE may need to be pursued in a similar vein in order to protect the common good. However, with the appropriate protections in place, the research and implementation of these HE can still uphold the dignity of the human person and the common good of the nation.

There are many other values at stake as well. Political and military leaders may be tempted to exaggerate the necessity of HE under the guise of national security. Doing so would undermine the cherished values of the military and the democratic trust in the nation and its leaders. These types of temptations are real and dangerous. History has shown that the justifications for war are often exaggerated.[6] On the other hand, there is an area of uncertainty as well. With the proper measures, the potential for abuses can be mitigated if not eliminated.

To stand on the sidelines and take a wait-and-see approach to HE could put a nation at a disadvantage in future conflicts. This is especially true when private entities are hard at work conducting HE research and willing to sell their products to the highest bidder. Leaders in politics, religion, science, ethics, and the military have the important task of being proactive in this endeavor. These same leaders must be aware of the dual-use dilemma that exists in this field. HE can be used to reduce or prevent future deaths or they can be used with unprovoked aggression to undermine human dignity. Protocols must be in place to protect all parties, chiefly the individual soldier. Moral criteria must be established for the research, use, and implementation of HE. Human dignity must be upheld in all stages; from development to use.

B. Can HE Uphold Human Dignity & Simultaneously Promote the Common Good?

The topic of the use of HE in the military and the development of moral criteria for their research and use is critically important for a variety of reasons. History has shown us that abuses can be very tempting. With war comes greed and the pursuit of power and money. Yet with the end of war comes peace, at least ideally. Hopefully HE can play a part in the prevention of wars. If not, at the very least it is hoped that they can lessen the impact of war on humanity. Diplomacy and policies of prevention and deterrence are morally preferable to war but unfortunately are not always pursued. Although protecting the nation is of fundamental importance, it must not be at the expense of the dignity of the soldier. A nation that fails to uphold human dignity has already failed as a nation.

The arrival of the field of bioethics in the 20th century highlights that ethics, policy, and law are all too often forced to play "catch up" with the accelerated pace of technological advancements. This is a fundamental problem that must be addressed by ethicists. A renewed and proactive approach must complement the reactive approach of the past. If HE are to be implemented they need to have undergone rigorous testing. Their use appears to be an inevitable reality. Bioethicists have an obligation to take a proactive stance and begin to address some of the theoretical and hypothetical questions that could arise from HE. A reactive approach is riddled with human rights abuses and failures. Indeed, these abuses and failures may be even more likely given the relatively limited number of laws and policies governing the field of HE.

Conversely, implementing a research moratorium on the field might have the opposite effect and drive much of the research underground and put a nation at a disadvantage. The military is an appropriate medium to harmonize this gap. Agreements in the military are

generally less problematic because, by their nature, they affect whole populations. Legitimate concerns of undermining human dignity must be placed in the context of a realistic scenario wherein a nation is no longer able to protect itself and the common good from the reasonably probable contingencies of its enemies.

One of the strengths of the military is its conveyance of a familial mentality.[7] Soldiers identify with the military, its values, and feel an obligation to further its objectives, especially with the all volunteer force that now exists. In many cases the familial mentality is the overwhelming motivating factor in why soldiers volunteer for military service. This cannot be overlooked in the discussion of HE because virtues such as courage, honor, self discipline, and justice are all cultivated in the soldier from the moment they enter military service. If HE undermine these virtues and values, than in many ways they undermine the pretenses under which soldiers volunteer for service. On the other hand, if they uphold these values this strengthens the trust between a soldier and the nation. Potential soldiers will be encouraged that the research and application of HE is being conducted in an ethical manner with safeguards in place for them. The role of the soldier in the use and implementation of military HE and the impact of this on society will be discussed at length in this dissertation.

During peacetime, military medical ethics resembles the decision-making process of its civilian counterpart. There exists the doctor-patient relationship. Patient autonomy is respected and the goals of medicine are pursued. Yet these values are often nuanced when the strategic objectives of a nation are included in the discussion. In the military there always remains the element of being prepared for war and its effects on medical ethics. This is of crucial relevance to HE and their use in the military. Generally speaking, society understands the goal of the military is to protect the populace from aggression and maintain the current way of life. Society

is more likely to come to a positive consensus when they know that HE will only be used to protect the nation and its common good. On the other hand, society is more likely to resist the use of HE in the civilian sector for a variety of reasons. Issues of access, fairness, coercion, and cheating are just a few of those concerns.

During war, military medical ethics takes on a more utilitarian methodology.[8] The individual patient's autonomy may be overridden in order that the military achieve its strategic objective. Emphasis during war is placed on advancing the common good of society and protecting the nation from aggression, instability, or anything that threatens its existence. The risk of abuse rises significantly at this point in the discussion. Nonetheless, the soldier's rights should be restricted only insofar as what is necessary to accomplish the mission of national defense, and nothing more. Their rights should never be restricted to the point where their human dignity is undermined. Soldiers sacrifice many things during the course of their service. These include being away from their family for extended periods of time and putting their lives in danger in service to their country. They are sons, daughters, mothers, and fathers in society and their lives have intrinsic value. Even if they are wounded, they retain their human dignity and they remain an individual member of the military in particular and of society in general.

How a nation determines whether or not it will wage war is often gauged by the Just War Theory (JWT). The three essential elements of the JWT come from St. Thomas Aquinas' *Summa Theologica* 2.40.1.[9] They are competent authority, just cause, and right intention. Numerous authors have included other elements as well.[10] The JWT is relevant to the discussion of HE in the military. HE in the military would alter the physical person in warfare, at least at some basic level. Similarly, HE would alter the application of that person to combat scenarios that they find themselves in during war. The GWOT has forced a reevaluation of sorts of the JWT because in

the current operational environment the scope of warfare has shifted from general to limited. Just cause and right intention are also brought into question. As previously noted, HE in the military can be used for immoral purposes that undermine the human dignity of the soldier. Thus they bring into question whether or not waging a particular war is just.

Once again, using HE in the military to accomplish strategic goals of a nation could lead to abuses. The importance of a proactive approach is highlighted. The Geneva Conventions define many of the rules of international war. The Belmont Report regulates what type of research can be done on human subjects. Both of these documents were reactions to brutal and atrocious human rights abuses. As HE become more at the forefront of reality and more readily available, protections in place become all the more crucial. To protect the dignity of the soldier, HE research and its application needs a powerful ethical framework and legal guideline. Ethical, legal, social, and policy implications (ELSI) are at stake if a rubric with protections is not in place. This dissertation will pay particular attention to this dilemma in the subsequent chapters.

All human persons have equal worth and human dignity. Human dignity flows from the very nature of the human person.[11] It transcends time, country, race, and creed. Respecting the human person in research entails respecting them as a subject of moral worth. HE in the military could call into question our fundamental understanding of human nature and human dignity. This is an especially important task for bioethicists. All leaders who are entrusted to the task of investigating military HE and their research and application must start with the basic premise of the dignity of the human person. International laws and guidelines are in place here that can further act as a guide.

The United Nations (UN) stands as a champion on this issue on the international scene. *The Universal Declaration of Human Rights* (1948)[12] and the recent UNESCO *Universal Declaration on Bioethics and Human Rights* (2005)[13] made hard line stances against the human rights abuses of the last century. Both documents highlight human rights as flowing directly from human dignity. In the context of HE, human rights are protected by international humanitarian law (IHL) such as the Hague Conventions, Geneva Conventions, the 1972 Biological and Toxic Weapons Convention (BTWC), and the 1993 Chemical Weapons Convention (CWC) amongst others. Institutions such as the UN and other codified international law assist in bringing about greater respect for human rights.

In order to enrich the discussion of HE in the military a mention of the soldier is necessary as well. Soldiers volunteer for military service under the auspices of a number of written and unwritten obligations. They may be asked to give their life for the nation, but in return they are promised they will never be abandoned. Their freedoms may be limited at times. For example, informed consent and respect for autonomy may at times be diminished in order for the military to achieve its strategic objective for the nation. In the past this occurred when experimental vaccines were mandated for soldiers deploying to combat zones. In these types of cases a paternalistic philosophy was implemented to solve the dilemma. This type of philosophy is embedded in the very core of the U.S. military.[14]

From 1998-2004 many soldiers were forced to take anthrax vaccines because it was deemed that the benefit outweighed the risks of forgoing them.[15] The thought was that if soldiers refused an investigational drug and then subsequently died from exposure they would be putting the strength of the fighting force at risk. The military was prepared to contend with the alternative of soldiers taking an investigational drug and then subsequently dealing with

unforeseen side effects also putting the strength of the fighting force at risk. Although the vaccine was still deemed investigational, it had been tested at length. This case is extreme, but soldiers understand this is a possibility. If the likelihood exists that more harm will come if the vaccine or drug is forgone, then it must be taken.

In the context of HE in the military, this creates a scenario for potential abuses. In many ways soldiers can be considered a vulnerable population. United States history is full of such cases.[16] The Belmont Report laid out the basic ethical principles that should act as guidelines in conducting research involving human subjects.[17] The Department of Defense's Common Rule expanded on this and gave soldiers the same protections that their civilian counterparts receive when it comes to research.[18] Soldiers however, deserve even greater safeguards and protections. They are not only susceptible to coercion from their nation under the banner of national security but also from their direct line leaders who control many aspects of their life including promotion and retention. Additional Institutional Review Boards (IRB's) devoted specifically to HE in the military would also lessen the potential for abuses. The intrinsic value of the human person can often be overlooked in the end centered realm of HE research in the military.

It has been claimed that many technologies are too futuristic to warrant serious research and thus ethical attention.[19] This viewpoint overlooks the reality that much of the technology we have today was developed from a proactive approach to research. One example of a proactive approach to HE in the military is Defense Advanced Research Projects Agency (DARPA).[20] DARPA plays a crucial role in the strategic vision of what warfare might look like in the future. Their approach, balanced with protections and dialogue with leaders from a variety of fields, is an example of how human dignity can be upheld while protecting the nation from adversarial

threats. Research entities such as DARPA and the governmental institutions tasked with their oversight will be discussed at length in the subsequent chapters.

Nations have a right to self defense. Soldiers have a right to protections that uphold their dignity both during their service and after their obligation is complete. War creates physical and psychological scars on soldiers, nations, and the populace. HE hold the potential to eliminate or lessen these problems. The integrity of the institution of the military and the legitimacy of the nation are at stake if HE research and implementation are riddled with abuses. The ultimate goal is a society where humans can flourish without war, the common good is advanced, and the people enjoy a stable peace.

C. Moral Criteria, Their Application, and Advancement of the Common Good.

Alteration of our body and our mind to relieve pain or provide healing is attractive to all members of society whether they are sick or healthy. Alterations that provide the competitive edge in war are also attractive to leaders and society. As this dissertation will show, HE research is being conducted in a variety of fields including pharmacology, genetics, mechanical engineering, and nanotechnology. All of these fields have something to contribute to the debate surrounding HE in the military. Nanotechnology in particular is of interest to the United States. The Institute for Soldier Nanotechnology (ISN) was established in conjunction with the U.S. Army in 2002. One possibility that is currently being researched is using nanoparticles to target drug delivery to different sites of the body.[21] This has enormous implications for soldiers, especially for wound management during combat.

However, moral criteria need to be established to act as a protection for soldiers when determining if HE in the military advance the common good. These enhancements could very

well alter the appearance of the soldier at both the anatomical and physiological level. Moreover, these enhancements may in fact alter character and virtue traits that have come to be synonymous with the soldier, such as courage, honor, and justice. In this discussion there will inevitably be competing claims to justice that will need to be addressed and balanced. The four primary forms of HE are cognitive, physical, emotive, and moral. Moral enhancement (ME) shall not be addressed in the present discussion. Each of these forms is unique and has potential for military application. At times, these forms also converge upon each other and overlap. The strategic vision of what warfare will look like in the future dictates what type of research, for what purposes, and what forms of HE will be used. Whether or not the HE's that are researched and developed actually come to fruition and impact future wars is speculation based upon a nation's best predictions. HE in the military will challenge soldiers and leaders to adapt to a new landscape while adhering to tested paradigms of just war, character, values, and virtue.

Cognitive Enhancements (CE) can be accomplished in a variety of ways. Brain-machine interfaces (BMI), pharmaceuticals, and brain imaging are all forms of CE aimed at altering the cognitive function of the brain. Enhanced learning, creativity, and memory are just a few of the attractive possibilities for the military that CE hold. CE have been given to military aviators for nearly 20 years in the form of pharmaceuticals that help guard against sleep loss and sharpen focus.[22] Not all pharmaceuticals are safe and their abuse can be deadly. The widespread availability on the international market of such drugs as *Ritalin*, *Prozac*, *Valium*, and *Adderall* all lend caution to their use. Their use in the military can be disastrous, especially if taken without a prescription. CE tend to me more problematic than PE because there are reservations about reversibility and if there are any long term risks that have not yet surfaced.

Physical Enhancements (PE) include performance related enhancements that increase strength, lung capacity, immune response, and fatigue response amongst others. This includes the more controversial gene doping as well. The wars in Iraq and Afghanistan have highlighted many of the inadequacies that soldiers have to overcome in combat zones. One such inadequacy is wound management. In particular, one way to achieve this may be through pharmaceuticals that target areas of the body with near instantaneous reaction time. PE seem to be the enhancements that society is most accustomed to having some knowledge about. Controlling an alertness level or sleep/wake cycle of a soldier would give soldiers a huge advantage. This is particularly true in Special Operations units which conduct missions at an extremely high tempo. Allowing soldiers to get back into the fight sooner and be just as agile would ultimately pay dividends in terms of overall mission success and accomplishing strategic objectives.

Emotive Enhancements (EE) include the ability to emotionally control oneself during highly stressful situations. One such application of EE might be the ability of soldiers to eliminate the risk of psychological or emotional stress. EE may be able to target a variety of emotions that can have a significant impact on the solider in war. These include mood, anxiety, and empathy. EE bring with them serious ethical challenges as well. Most obviously, will controlling emotions actually have the opposite effect in war? In other words, will EE control emotions to the extent that soldiers no longer are capable of acting as moral agents, thereby creating the conundrum of taking responsibility for actions?

The heart of the present work revolves around developing moral criteria for a rough ethical framework for military HE. The basic tenet is the dignity of the human person as the foundation for a military HE ethical framework. Throughout the research and during implementation, the soldier should never become a means to an end. The soldier should always

remain a human person with intrinsic value. The proposed moral criteria for the use of military HE set forth are: (1) reversibility, (2) uphold moral agency and existing military values, (3) voluntary informed consent, and (4) non-enhancement alternatives exhausted.

Reversibility (non-permanence) overcomes many of the ethical and legal concerns surrounding military HE. Most apparently, it allows the soldier to transition back to civilian life without any long term side effects of the HE. The details and sacrifices asked of soldiers in future wars remain uncertain. Non-permanence allows the soldier who has undergone a HE to resume daily life again and have an open future. Non-permanence also avoids many of the concerns of distributive justice and a have vs. have not class hierarchy. On the other hand there is the real risk of addiction and withdrawal. This once again highlights the importance of proper research protocols in place for the protection of the soldier. A HE may be used on the soldier for the sake of the common good therefore the demand on justice is fulfilled. Normal everyday citizens have a more difficult time making this demand to justice. It is not a matter of fairness or equality that HE may be used on soldier. It becomes a common good claim for the sake of the way of life and security of the nation.

Upholding moral agency and existing military values is crucial because to undermine these basic tenets of the military would bring its legitimacy into question. If HE are abused and this criterion not upheld, it could have drastic effects on the number of future recruits who would be willing to volunteer for service. It is imperative that soldiers who volunteer for HE research or implementation are not incentivized in any way. No awards should be issued and no honors granted. This protocol will serve to uphold the virtues of honor and courage while undertaking these acts for the common good and security of the nation. HE must not be so prohibitive that they undermine the possibility for the promotion of virtues which has a long standing tradition in

the United States. This highlights the concern that some nations may not be willing to forego the advantages that HE provide and may commit human rights abuses in the process. The moral high ground is necessary here. No HE that undermines human dignity is permissible, even if for the security of the nation. This topic shall also be discussed at length in the subsequent chapters.

Voluntary informed consent free of coercion is also an area that is subject to abuse. In the current GWOT there are hundreds of different incentives and bonuses that the soldier can choose from when considering advancement, retention, and reenlistment. These bonuses range from $5,000 to $150,000. The military is always trying to incentivize its soldiers, especially those with specialized skills, to stay in the ranks rather than take their skills to the private sector. There should be no monetary bonuses or advancements in rank for those that volunteer for HE research or implementation.

There is also concern that soldiers will be forced into situations because they are a vulnerable population.[23] True informed consent will only be possible if direct line leaders are removed from the process. In many ways, there is the issue of horizontal pressure from peers and vertical pressure from the chain of command. The chain of command is embedded in the structure of the military. Going outside the chain of command undermines authority and brings into question the direct line leadership. Soldiers who volunteer for HE research must provide informed consent in a setting where there is no fear of repercussions from leadership. Informed consent will promote the democratic trust of the citizens as well by upholding principles such as respect for human dignity. This is an area where the military must shy away from the paternalistic approach and allow for more autonomy of the soldiers.

Exhausting all non-HE alternatives first is crucial to this discussion as well. Less morally problematic means to achieve the strategic objective should be used first. HE should be used sparingly and as the exception rather than the rule. Proportionality and the fair distribution of risks need to be considered. There will always be unforeseen and unintended consequences. Admittedly, this will need to be constantly evaluated and readdressed. HE may need to be applied more vigorously, depending upon the context, but they would nonetheless remain subject to upholding the principle of human dignity. A nation that is able to control the technology will necessarily be at a strategic advantage. The nation must also be able to reign in their use and ensure that they are not an everyday expected phenomenon. Otherwise the nation runs the risk of using soldiers as a means rather than an ends.

To further expound on this, the four moral criteria will need to be applied to concrete research currently being tested in the military in order to determine if they advance the common good of the nation. The first example is the use of BMI in relation to CE. Very simply, BMI technology works by making direct communication between the brain and the computer interface.[24] Current technology connects nodes to the nervous system and then that data is processed by the interface and commands are interpreted and given. BMI sounds futuristic and indeed it is. However, it may have application in the military in the future by controlling remotely operated devices while being connected to a soldier's brain. The main concern with BMI is that the human brain is too complex to possibly understand all of the long term effects. These effects may never present themselves until the harm is irreparable. Similarly, the argument could be made that many of these tasks can be remotely accomplished through drones.

The second example put forth is PE involving genetic engineering. Genetic engineering could be used to alter metabolism and improve physical capabilities.[25] Soldiers could be

engineered to go days without sleep. Muscles and joints could be engineered to be more resistant to injury and able to carry more weight over greater distances. The obvious objection would be whether or not the criteria of non-permanence could be satisfied. If this type of PE is not reversible than this would create issues of distributive justice and fairness as soldiers reintegrated back into civil society would be part of a have vs. have not class. To be sure, society would object to such outcomes. Other questions include would there be safer, less invasive ways to accomplish these tasks. Perhaps it could be accomplished through pharmaceuticals that would be tested and reversible with relatively ease.

The third example put forth is the use of *Propranolol* for PTSD prevention and treatment as an EE in the military.[26] Strictly speaking if this example could satisfy the four moral criteria proposed than its use need not be limited to the military because soldiers (and others in civil society) who suffer from such trauma could be helped as well. Nonetheless, there are concerns that perhaps *Propranolol* has negative long term effects on deadening other emotive responses. Emotions are tied to many other factors of the human person including moral development. Perhaps there is more value in the struggle, and the healing is more permanent, when compared to taking *Propranolol* alone. Conversely, it is difficult to forgo such treatment when the life and well being of the soldier is at stake. Memories and emotions play a crucial role in how we learn as humans. Taking *Propranolol* might stunt some of these in the long term and the unforeseen effects could be disastrous. Whether or not there are safe and effective non-enhancement treatment options available in addition to *Propranolol*, such as counseling, will be the subject of further investigation in this dissertation.

The four proposed moral criteria and their application to specific examples of HE require a proper understanding of the common good. Actions that promote the good benefit the

individual and the greater society as a whole. HE technologies in the military should fulfill our ends and promote human flourishing. However, scenarios must be addressed when the individual good may be superseded by the greater good of the nation itself. In such cases, advancing the common good is not a clear cut solution and may require a contextual approach to the situation. All of these topics shall be addressed at length in the following chapters in order to come to a complete understanding of the common good.

There are many recommendations that need to be made when it comes to military HE research and implementation. Transparency is crucial because it shows that the nation is ready to overcome the past abuses and place the dignity of the human person at the forefront of the debate. Concerns over secrecy can be overcome as well. An independent board can be compiled with respectable, bipartisan, and unbiased leaders in these fields including ethicists. These leaders would have security clearances and can hold the democratic ideals in trust when transparency is limited due to security concerns. When dealing with issues of national security there will always be individuals who will need to keep the secrets of the nation. In the present case those secrets must adhere to established ethical standards and uphold human dignity. Similarly, special ethics committees and IRB's will likely need to be established. Hopefully this dissertation can be used as a rudimentary model of how to approach the use of military HE.

Moreover, the ultimate goal is an end to warfare so that humanity can live in sustained peace. Universal principles codified into international law are a positive step in this regard. Nations do not necessarily need to have universal policies. This would be convenient but not likely, especially at the initial stages of the development of HE for use in the military. However, nations must come together with guiding principles, purposes for what HE may be used for, and limits as to what is forbidden. Indeed there will likely be nations that will not desire to adhere to

such standards. This should not preclude other nations from taking a stand in favor of human dignity and signing onto such international agreements. The most obvious universal principle that nations should come to agreement upon is upholding the dignity of the soldier. This will in turn lead to greater protections and promotion of human rights for individuals in the world.

D. Chapter Outlines and Their Support of the Thesis

This dissertation develops four moral criteria for appraising if HE in the military advance the common good. It is hoped that these criteria provide a guideline for leaders wherein they can engage the debate of HE in the military through an informed medium. In turn, this will ensure that the nation and its population may accomplish a variety of multifaceted and complex objectives. These include promoting the dignity of the human person, protecting the nation and its way of life from future aggression, eliminating warfare and its impact on humanity, and ultimately advancing the common good wherein humans can flourish in society.

Chapter two begins with a discussion on the subjects of military ethics, virtues, and values. Military medical ethics is then compared and contrasted with its civilian counterpart. The differences and similarities are highlighted between peacetime and wartime applications. A discussion of the JWT is then undertaken with conventional approaches offered in light of terrorism and emerging technologies. Finally, a brief description and definition of HE are offered. Chapter two is crucial because it lays the historical foundation and background of this dissertation.

Chapter three expands upon the definition of HE from chapter two by entering into a philosophical discussion of the dignity and rights that flow from the human person. The importance of a rigorous human research protocol is highlighted in respect to significant past

abuses. Numerous legal and ethical guidelines are examined at length. Their strengths and weaknesses are evaluated and suggestions are offered in relation to their application of HE in the military. Chapter three supports the thesis of this dissertation by reinforcing the philosophical and theological grounds on which the concept of human dignity rests. In this way, it highlights what is at stake if military HE fail to promote the dignity of the human person.

Chapter four analyzes technologies from scientific fields such as pharmacology, genetics, and nanotechnology and their impact upon the forms of military HE. The future of warfare and how the strategic objectives of the nation influence research are then analyzed at length. CE, PE, and EE are discussed and scrutinized. Finally, groups such as DARPA, pharmaceutical companies, and relevant military departments and institutions are investigated for their contributions to the field of military HE. Chapter four is crucial because it provides realistic scenarios of what HE in the military might look like in the future and highlights the importance of keeping institutions in check so that abuses are avoided.

Chapter five provides moral criteria for a proposed ethical framework for military HE. This is the heart of the thesis of this dissertation. The four moral criteria of non permanence, upholding moral agency and military values, voluntary informed consent, and non-HE alternatives exhausted are discussed at length. The importance of respecting human dignity and its relation to the goal of ending warfare across the globe are also highlighted. Chapter five is pivotal because it provides a yardstick of sorts that can assist leaders who are called upon to make moral and ethical decisions in this field.

Chapter five also applies the four moral criteria to concrete examples to determine whether or not they advance the common good. The examples of BMI, genetic engineering, and

the use of *Propranolol* are analyzed to determine if they adhere to the proposed moral criteria, uphold human dignity, and advance the common good. Finally, chapter six offers conclusions and recommendations. A discussion of the common good and competing notions of it are offered. Strengthening research protocols and IRB's, greater transparency, and universal principles codified into international law will have a positive impact on military HE and their application. At the same time these recommendations will prevent much of the past abuse on human research subjects.

Conclusion

Chapter one has laid out the background and thesis of this dissertation. Specifically, it has addressed what the problem is, why it is important, and how it will be addressed in the following chapters. Although each of the subsequent chapters could be taken as a stand-alone text, they are meant to build upon each other to provide a more complete contextual analysis of HE in the military. There are many conclusions that can be made after a robust discussion of HE in the military. HE have the potential to protect the national security, counter terrorist activities, allow for faster recovery of soldiers and a faster return to the fight. HE could also create safer environments for soldiers, result in fewer deaths from treatable wounds, reduce defense expenditures, and potentially eliminate many of the nonphysical wounds of war. Clearly, HE will slowly play a greater part in accomplishing the strategic objectives of the United States military. It is hoped that this dissertation can be a piece of that illusive puzzle to ending warfare, or at least lessening its impact on society. That goal has long plagued the history of humanity. If leaders start with the premise that HE in the military must respect human dignity, then the goal is clearly achievable through ethical and moral means.

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Chapter Two: Military Ethics and Human Enhancement: A Background

Introduction

Chapter two of this dissertation begins with a discussion on military ethics and the values and virtues encompassed therein. Military medical ethics is then addressed in both peacetime and wartime scenarios and the two are compared and contrasted. The topic of just war theory (JWT) is crucial at this point. Much of the theoretical and practical foundations upon which the JWT rests have been significantly altered in the face of terrorism and emerging technologies. These emerging technologies come in a variety of mediums; from robots, drones, and GPS guided ammunitions to exoskeletons, non-lethal sonic weapons, and nanotech implants for soldiers. It should be noted at the outset that although this dissertation takes a US military perspective for much of its content and application, this dissertation may also be applied to an international perspective as well.

Although the aim of this dissertation is to focus on human enhancement (HE) in the military, the role of emerging technologies that do not alter the human person will be briefly addressed in this chapter as well. The soldier, who may be asked to use pharmaceutical enhancements to overcome fatigue on the battlefield, remains the most important factor in warfare. "The greatest and most precious resource of the US fighting force is the individual soldier."[1] Yet, that same soldier's effectiveness is also dependent upon the modern weaponry at their disposal and their ability to use it appropriately and prudently. Thus, the application of HE and emerging technologies are often intertwined with each other. Finally, this chapter concludes with an introduction to HE that will serve to set the background for the subsequent chapters of this dissertation.

I. Military Culture

A. Introduction

On a practical level, many people think of ethics as rules meant to differentiate between right and wrong behavior. "How should I act in this situation?" or "Am I permitted to do X if Y will result?" Some examples of guiding ethical principles include the Golden Rule, the Sermon on the Mount, the Ten Commandments, and the Hippocratic Oath. The military is a unique culture in its own respect and has its own guiding ethical principles. The military "exists to serve society by protecting its very foundation, the legal and moral framework upon which the society is based."[2] Obviously, there is much that could be written about military ethics but this is beyond the purview of this dissertation. A working definition of military ethics that this dissertation shall adhere to is provided by Stadler:

> Military ethics judges and justifies military actions from a moral point of view. It defines standards of good behavior for individual military personnel (as individuals and/or members of a group) and develops those standards. It asks critical questions of existing laws, if necessary, within the framework of the democratic process. A central concern of military ethics is the question of the use of organized military force; to slightly overstate this, it deals with the question of "When may a person as a soldier use physical force or even kill and how may/must/should he use force?"[3]

B. Military Ethics and Values

A system of military ethics must establish credibility and legitimacy both within the military culture it seeks to promote and the nation it is ordered to protect. "For an ethical system to be useful in a military context, it has to enable soldiers to persevere in their military duties while preserving their characters."[4] This is important because for as much as soldiers represent the military, they also remain individuals responsible and accountable for their own actions. A

fitting definition for character is provided by Shay and Munroe who define it as, "a person's attachments, ideals and ambitions, and the strength and quality of the motivational energy that infuses them."[5] A soldier with character does more than just blindly follow orders. The soldier is called to rely upon beliefs, values, and convictions, both personal and of the culture they represent, to make tough ethical and moral decisions. Often the consequences of these decisions result in long-term physical and emotional pain. As Hartle has pointed out, "Obedience that results from fear cannot be relied upon in crisis situations when immediate dangers overwhelm the threat of sanctions. The value of obedience in the military context must follow from commitment to the institution."[6]

The Schwartz Value Theory, which is widely recognized in the field of social psychology, views values as "conceptions of desirable trans-situational goals that vary in importance and serve as guiding principles in the life of a person or other social entity."[7] Values play a large part in a soldier volunteering for military service along with a multitude of other factors as well. These other factors may include lack of employment, strong personalities, financial concerns, religious beliefs, and patriotic sentiments. Not surprisingly, however, one recent study found that personal values play an enormous and distinct role in predicting a soldier's motivation to lead.[8] In recognizing their importance, the United States Army uses the acronym LDRSHIP to describe its Core Values: [9]

Loyalty
Duty
Respect
Selfless Service
Honor
Integrity
Personal Courage

Loyalty is related to more than just ones country in general. Soldiers take an oath to specifically "support and defend the Constitution of the United States."[10] Soldiers also show loyalty to their specific military branch (Army, Navy, Marines, etc.) and to their fellow soldiers. Duty involves fulfilling responsibilities and obligations. Although the particular duties are different for each soldier, the military is more likely to succeed in their objectives when soldiers perform their duties. Respect entails treating other soldiers with inherent dignity. This applies equally to superiors, peers, and subordinates. Selfless service reminds soldiers that they will be called upon to place others and the mission before their own interests and desires.

Kirkland argues that honor alone is the "central ethical construct that has defined military personnel for centuries."[11] However, given the multifaceted work that soldiers perform in today's military, it seems that the LDRSHIP acronym is a more thorough description of military values than of honor alone. Kirkland however, does acknowledge the importance of integrity and taking care of subordinates as the two fundamental components of honor.[12] Indeed, without integrity, trust would soon be undermined. Finally, personal courage is more than just standing firm in the face of the unknown. It involves the moral courage to act ethically, even perhaps when leadership personnel are trying to persuade the soldier to do otherwise.

The LDRSHIP values are memorized and engrained in soldiers from the first day of military service. Soldiers are repeatedly quizzed on these by their superiors. They are expected to adhere to these values whether they are wearing the military uniform or not. Although these values are specific to the military culture, they are also values that the American people expect soldiers to uphold. Some scholars argue that this is an inherent truth of the military because members of the military are direct products of the American society.[13] Along these lines, Baumann has argued that in all constitutional democracies, the values implicit in the constitution

of that nation must be the guidelines that the military adheres to and upholds. In support of his thesis, he cites examples such as human dignity, human rights, individual responsibility, and freedom.[14] Cherished values such as these offer the soldier ideals to strive for both in peace and in war. Conversely, soldiers who act without a clear moral purpose in this regard run the risk of conveying an attitude of disrespect. This can lead to a nation questioning the character of its soldiers which may result in diminished overall support for a particular mission or war in general. Similarly, soldiers who fail to uphold values such as these may undermine the validity of military missions in the eyes of the enemy with whom they ultimately must reconcile and establish peace.

Hartle believes that honor, duty, and country are the three main values of the military.[15] In creating a framework for military bioethics, Mehlman and Corley take these and the seven Army Values (LDRSHIP) and synthesize them into what they argue to be the four core military values. They are selflessness, the duty to obey lawful orders, accountability, and the obligation to look out for one's subordinates.[16] Selflessness is important because soldiers put their own personal welfare as secondary to that of the nation. The duty to obey lawful orders is crucial because it ensures timely success of the mission. Accountability is vital because it highlights the importance of individual responsibility in the decision making process. Finally, the obligation to look out for ones subordinates is essential because it upholds the faith of the soldier in their leadership.

Similar to the Army Values, the Unites States Army established the Warrior Ethos to give soldiers a motto to live by. It is comprised of four main pillars. These pillars can be grouped in various ways under the Army Values LDRSHIP acronym. They are:

1) I will always place the mission first.
2) I will never accept defeat.
3) I will never quit.
4) I will never leave a fallen comrade.[17]

These pillars are also engrained in soldiers from the moment they enter military service. Although these are still formally taught by the Army, some military science scholars believe they are no longer sufficient given the complex environment that soldiers are called to operate in.[18] This environment is often referred to as, *the gray zone*. This signifies those areas of conflict that lie somewhere between peace and formal war.[19] These include complex mission sets that fall under titles such as humanitarian, TAA's (train, advise, and assist), intelligence collection, and battlefield preparation. Having a set of values to rely on in these different environments can assist soldiers in navigating through these complex missions that are becoming ever more common in the modern military. Whether or not the military will shift its values and ethos to adapt to modern mission sets remains to be seen. This much remains clear however, values play a crucial role in the effectiveness of any system of military ethics.

Values serve as motivating factors to soldiers and to society. As the preceding paragraphs have highlighted, there are differences of opinions on what ultimately are the core values of the military. Regardless of the particulars however, it is important that soldiers and society "buy in" to the larger scheme of military culture. Doing so strengthens the democratic trust and serves as a system of checks and balances between all parties involved. Yet, it is important to note that values are not virtues. Values are merely norms that are adhered to either individually or collectively in a culture, such as the military. These values say little as to whether or not they are considered good or bad. Instead, virtues are aimed at answering questions of right and wrong or good and bad behavior.

C. Military Virtues

Historically, the Greek philosopher Plato is well known for his advocacy of the four cardinal virtues of wisdom, courage, temperance, and justice. Aristotle used these and put forth other virtues as well, including moderation in the *Nicomachean Ethics*. Moderation was important because it signified the balance between two extremes. Aristotle also held (*Book II, Ch. 1*) that, "It is by doing just acts that we become just, by doing temperate acts that we become temperate, by doing courageous acts that we become courageous."[20] Yet virtue is more than just action and motion, it is a habit of acting well and appropriately. Thus, an act is virtuous if it is done knowingly, willingly, and for the sake of virtue.

Aristotle defined virtue (*Book II, Ch. 1*) as "a state of deliberate moral purpose consisting in a mean that is relative to ourselves."[21] At that time, the idea that laws imposed by the government were necessary to make people virtuous began to be put forth. These two Greek philosophers had a tremendous impact on St. Thomas Aquinas (Aquinas). Although Aquinas is well known for his advocacy of the JWT that shall be discussed later in this chapter, the present aim is to discuss his impact on the role of virtues in the military and to emphasize their importance in forming soldiers to act in an ethical manner as representatives of the nation.

Similar to Plato and the ancient Greeks, Aquinas was also an advocate of the four cardinal virtues, albeit under slightly different titles (prudence, justice, fortitude, temperance). Yet for Aquinas there were also theological virtues that played a part in his moral philosophy and ultimately became the basis for his JWT. These theological virtues are faith, hope, and charity. For Aquinas, the cardinal and theological virtues are inseparable. Virtues are also important because they play a large part in ensuring human flourishing and happiness and promoting the

common good. As Gorman points out, "[For Aquinas] virtue is not only essential for individuals to live well; it is also incumbent upon communities to promote virtue and pursue policies that are in accordance with virtue in order to advance the common good."[22] The topic of common good shall be discussed in chapters five and six of this dissertation as well.

For Aquinas, the virtue of prudence is defined as "right reason applied in action" (*ST II-II, q. 47, a. 2*).[23] This virtue is important because soldiers are continually asked to make decisions that have second and third order effects both upon their peers in peacetime and on the battlefield during war. Prudence requires "taking into account all the dangers of action or inaction and trying to find the best course of action given the circumstances."[24] The young soldier, who just entered military service, might find this virtue difficult and confusing to uphold. In part, this is because decision making in the military often involves actions that are directed toward an enemy aggressor, whereas these types of decisions are completely foreign to civil discourse.

Similarly, virtue comes about through habit and experience. Making prudential decisions during battle is not something that can be, strictly speaking, practiced ahead of time. However, a recent trend seems to be a greater movement toward ethics education and character building in soldiers rather than adherence to strict rules that have been imposed by superiors.[25] This type of training can be valuable for a number of reasons. First of all, by placing the soldier in a non-stressful environment, it allows them to recognize that there is an ethical dilemma and think it through at their own pace. Second, when conducted in a group setting, it also exposes soldiers to the opinions of their peers. This can serve to enlighten a soldier with opposing viewpoints and at the same time embolden them to defend their own positions. Aquinas argues that the practice of prudence in the military is directed toward military commanders (*ST II-II, q. 50, a.4*) because it

is related to the common good. Prudence may apply to the average soldier as well at times. However, because the bulk of the work that the average soldier undertakes is related to combat, Aquinas argues that the practice of fortitude (courage) is more often directed toward them and not military commanders (*ST II-II, q. 123, a. 5*). Reichberg adheres to this line of thought and argues that "To maintain a moral posture amid the fear, confusion, and uncertainty of the battlefield, military professionals [military commanders] must learn how to conjoin reasoned judgment, technical skill, and the appropriate emotional dispositions."[26] Although Reichberg argues that military professionals specifically must balance these emotions on the battlefield, the Global War on Terror (GWOT) has shown that this statement is applicable to all soldiers in combat.

Justice for Aquinas is defined as "the constant and perpetual will to render to each person his right, or what is due" (*ST, II-II, q. 58, a.1*). Similarly, justice is ultimately aimed at the common good, rather than at the particular good of the individual. Thus justice is considered "preeminent among all the moral virtues" (*ST, II-II, q. 58, a. 12*). Although the military has its own formal penal code entitled the *Uniform Code of Military Justice* (*UCMJ*), much of the "punishment" that is handed down on a daily basis to soldiers is of a more informal type of discipline and comes directly from their leaders. This naturally puts leaders in a position of power and influence over their subordinates. In response to this, leaders are called to be just in all of their actions to the soldiers that have been placed under their command.

At the same time for Aquinas, justice provides the moral rationale for killing an aggressor (under appropriate circumstances) during warfare for the sake of the protection of the common good (*ST II-II, q. 64, a. 2*). Justice must not be construed as a virtue that permits indiscriminate killing. Moreover, all human beings have human dignity, even if they are acting as terrorists or

enemy combatants. The proper motivation is crucial at this point. Force should not be used out of hatred, revenge, or self gratification.[27] This line of reasoning can reduce the soldier to utilizing the same thought process as their enemy and hinder virtuous behavior because the action is not taken with the appropriate intention.

Aquinas uses a soldier that enters the battlefield to defend justice and the common good as an example of fortitude or courage (*ST II-II, q. 128, a. 1*). Indeed, this is the virtue that most people envision when they think of the typical soldier. However, moral courage is important as well. Moral courage is "the capacity to overcome the fear of shame and humiliation in order to admit one's mistakes, to confess a wrong, to reject evil conformity, to denounce injustice, and to defy immoral or imprudent orders."[28] Moral courage is particularly different in the military where soldiers are concerned about the perception of their peers and of their superiors who write their annual evaluation report (*Non-Commissioned Officer Evaluation Report* (*NCOER*) or *Officer Evaluation Report* (*OER*)). Olsthoorn has argued for greater advocacy for the virtue of moral courage in the military because it actually benefits "the outsiders the military is there to protect."[29] In other words, moral courage has a larger societal impact than physical courage because by its very nature it is dealing with a moral question whereas physical courage may be motivated by other factors such as loyalty to ones unit. It is interesting to note that the Army cites personal courage as a value that includes physical as well as moral courage, however, it does not refer to it as a virtue.

For Aquinas, temperance is necessary to balance the human passions such as procreation, the pursuit of truth, and self preservation (*ST I-II, q. 94, a. 2*). This virtue applies in the military by calling on soldiers to act moderately in military operations rather than out of a desire for revenge, power, or wealth.[30] For example, after the death of a fellow soldier, there may be a

desire for revenge against the enemy or against a particular village. This deep-seated hatred can be extremely harmful because it hinders temperance and moderation and allows the passions to control moral decision making. As another example, in 2006 a poll was taken on sentiments of soldiers of the United States toward Iraq and its people. The poll found that only 47% of US soldiers (Army, Air Force, and Navy) and 38% of US Marines felt that Iraqi non-combatants should be treated with dignity and respect.[31] This begs the question as to whether or not this sentiment was sensed by the Iraqi people and reciprocated back in their relationship with US military personnel, thus perhaps accelerating the number of attacks and resentment of the US presence in their country.

As previously noted, Aquinas' theological virtues warrant some discussion as well in the context of virtues and their relation to military ethics. For Aquinas, "it is by faith that the intellect apprehends the object of hope and love" (*ST I-II, q. 63, a. 4*). Gorman extrapolates and argues that faith is "what enables the human intellect to recognize divinely revealed truth as good."[32] Hope according to Aquinas is "the expectation of a future good that is difficult but possible to attain" (*ST I-II, q. 40, a 1*). Moreover, hope is a motivating factor that causes soldiers to fight with greater courage during battle (*ST I-II, q. 40, a. 8*). Soldiers that react during battle out of fear then would not be practicing the virtue of courage. Finally, charity is the pinnacle of all the other virtues (*ST I-II, q. 62, a. 4*). To practice the virtue of charity "requires an active commitment to serving others and a willingness to sacrifice for the sake of the common good."[33] Interestingly, Aquinas discussion on the JWT (*ST II-II, q. 40*) is not located in his treatise on the law but rather in his treatise on the virtues of faith, hope, and charity. For Aquinas, this highlights the importance of soldiers practicing the virtues.

The discussion on military virtues has brought some modern virtue ethicists to critically evaluate the current system that the military uses to educate soldiers in right conduct. Olsthoorn, for example, argues that "Instead of devising a new list of virtues from scratch, one could also identify the weaknesses of the existing virtues and see if the way militaries interpret these traditional virtues can be improved."[34] In concluding this section on military culture, it is once again important to highlight that soldiers who fail in their duties to uphold military values and virtues leave more than just the safety and security of the nation at stake. As Toner has suggested, "Students of military ethics must ask, morality being taken away, then, what are armies but great mobs?"[35]

II. Military Medical Ethics

A. Introduction

Section II of chapter two addresses military medical ethics in peace and in war. It is not meant to be exhaustive in nature. Rather, it highlights the most prominent issues in the field of military medical ethics today, with particular emphasis on those issues that are related to the thesis of this dissertation. Most notably, human research, experimentation, and paternalism shall not be addressed at this point. They shall be addressed more appropriately and thoroughly in chapter three that deals with human dignity in relation to HE in the military.

At present, a set of guidelines created by the Defense Health Board entitled, *Ethical Guidelines and Practices for U.S. Military Medical Professionals* has yet to be adopted by the Executive Branch of the United States.[36] These guidelines include provisions for ethics education, training, and consultation. They also stress that the first obligation is to the patient and that medical professionals must never be forced to violate their conscience.[37] These are just a

small sample of the issues facing those in the field of military medical ethics. Other issues that shall be addressed in the following section include the physician-patient relationship, dual loyalty, torture, the Geneva Conventions and other international human rights law, impartiality, triage, and salvage.

B. Physician-Patient Relationship

Pellegrino argues that, "In medicine, whether in the civilian or military setting, medical ethics begins and ends in the patient-physician relationship."[38] The patients are asked to divulge private matters and place themselves at the care of the physician. Alternatively, the physician is trusted to act beneficently in treating the patient. The *Oath of Hippocrates*, written sometime around the 4th century BCE, is a pledge that many medical students and physicians take to direct their conduct as health care professionals. It states in part, "Whatever house I may visit, I will come for the benefit of the sick…" And then again, "I will apply dietetic measures for the benefit of the sick according to my ability and judgment; I will keep them from harm and injustice."[39] These statements highlight the importance of medical ethics and the physician-patient relationship as more than just a modern phenomenon.

Physicians may view this relationship in a variety of different models based upon their personal beliefs and motivations for entering the field of medicine. These include physician as technical helper, seeker of knowledge, as business person, and as social servant.[40] The most traditional model however, and most in line with the Hippocratic Oath, is the physician as healer or helper. In this model the physician is committed to the profession of medicine and is not interested in fame or fortune. Instead, the physician has an obligation to act for the good of the patient.[41]

Regardless of the how the physician or patient view the relationship, there are certain experiences of the human person that are consistent across all societies. Take for example, the occurrence of sickness and death which are universal to all people. These trials will be experienced by everyone just as they have been throughout all of human history. The progress of modern medicine may lessen the impact of their severity, but they will nonetheless remain core experiences of the human person in the future. Pellegrino summarizes this relationship by noting, "If a true foundation for medical ethics is to be found, it must be sought in what is unique to medicine, and this is the healing relationship between the patient and the physician."[42]

At the heart of the physician-patient relationship is the cherished principle of autonomy. This principle shall be addressed at length in the chapter three in the context of human research. However, some mention and examples are warranted here as well. In the ideal setting, the patient has the autonomy to choose their doctor and to divulge their medical and family history to the physician. The patient loses an enormous amount of privacy in this exchange. In return the patient is able to reap the reward of a more thorough diagnosis and health care strategy from the physician. In the military, limited autonomy is the norm, especially in the all volunteer force that currently exists. The larger question at present for the military lies in one of the side effects of limited autonomy, namely the harm principle. Visser argues that a "soldiers' personal autonomy should only be limited to prevent harm to others, including the organization."[43] Although this is the ideal, upholding this principle can be difficult, especially in times of war. Soldiers sacrifice many of their freedoms and autonomy for the greater common good of society. When the conflict ends, soldiers expect their autonomy to be largely restored. As Gross has pointed out, "military necessity only overrides patient rights; it does not nullify them. A soldier's rights reassert themselves when military implications are marginal or inconsequential."[44]

C. Dual Loyalty

Applying the physician-patient relationship into the military context may at first glance appear contradictory. The goal of the military is to protect the nation from harm. By its very nature, the military is created for deterrence and war fighting. It can be argued that there are many other mission sets, such as training or humanitarian, that fall under the purview of the military, but ultimately the military must be prepared to go to war for the defense of the nation. For many soldiers, war entails physical and emotional injury and upheaval. For others, it may bring about the loss of freedom or even death. Physicians take oaths to heal and act beneficently toward their patient. When the physician takes the military as their employer, the physician becomes "part of a system whose means is a direct cause of an incomprehensible amount of injury, illness, pain, suffering, and death."[45]

Given this conflict, some scholars have argued that physicians should not become soldiers because of the core principles of the two professions are at odds.[46] Madden and Carter, on the contrary, believe that the two professions can be harmonized because both "serve society by providing society with an essential service. [Medicine and the military] have different ends, yet the ends are certainly compatible, even mutually supportive."[47] As previously noted, the *US Army Medical Department's* (AMEDD's) motto is to "conserve the fighting strength." This means that AMEDD must keep soldiers medically deployable in order to meet the larger needs of leaders who operate at the national strategic level. This principle holds less relevance in the civilian sector because medical personnel are not burdened with meeting hard and fast quotas based on conservation. At the same time, civilian physicians do remotely participate in conservation by treating patients who are part of the larger society and preserving their way of life. Gross has similarly argued that during times of war, a utilitarian ethic may be more

appropriate because it will maximize the interest of the state and its preservation over everything else. “Freedom from ill-treatment may conflict with the right to life, leading a state to consider sacrificing the dignity of some to protect the lives of others.”[48]

Physicians in the military have duties to keep the chain of command informed on whether or not soldiers are deployable. At the same time, physicians also have duties of loyalty and confidentiality to the patient/soldier. They have obligations to protect the nation and to protect the soldier. To ensure that the fighting force is always ready, physicians may need to declare some soldiers as non-deployable. Some soldiers may be comfortable with this honest medical assessment. Other soldiers might feel stigmatized by the status of “non-deployable” because their peers may judge them unfairly. In tight knit military units, rumors often swirl. In turn privacy, although ideal, is untenable. This is especially the case with soldiers who have expressed suicidal or homicidal ideas to medical personnel. In such cases, disclosure and breach of confidentiality would be justified for the sake of the safety of the individual and other surrounding soldiers as well. Raju however, has cautioned that military psychiatrists run the risk of overriding their patient’s autonomy because of their ability to diagnose mental disorders and their authority to recommend relief from duty for psychiatric issues.[49]

Related to this discussion, Madden and Carter note that the three goals of medicine are: “(1) prevention whenever possible; (2) curative treatment when prevention fails, and (3) healing, the relief of pain and suffering, when specific treatment will not benefit the patient.”[50] Although military physicians need to adhere to the principle of conservation for soldiers, they are still for the most part, able to uphold these goals of medicine. Understandably however, this is often limited due to contextual constraints such as scarce resources or practicing medicine in a combat zone. On the other hand, the civilian physician has obligations as well, such as working to treat

and eradicate disease to prevent it from becoming a public health issue. Although, civilian physicians may not appreciate the extent of their own work, they do perform conservation often times at the most micro levels in society.

D. International Law

International humanitarian law (IHL) has much to say on the topic of the physician-patient relationship and dual loyalty. "Medical ethics in times of armed conflict is identical to medical ethics in times of peace, as stated in the *International Code of Medical Ethics* of the *World Medical Association* (WMA). If, in performing their professional duty, physicians have conflicting loyalties, their primary obligation is to their patients."[51] This is important to highlight because in the midst of 16 years of the GWOT, the United States military and political leaders still grapple with this balance. In speaking of this dual loyalty dilemma, Annas argues that "The 'physician first' guidance is only half of the story; the other half should be 'last and always.'"[52] Taking a position counter to the WMA and to Annas, Gross argues that "Medical ethics in times of war are fundamentally different from those in times of peace. War brings military and medical values into conflict, often overwhelming other moral obligations, such as a doctor's charge to relieve suffering, in the face of military necessity."[53]

This contentious debate will likely always exist while humanity is plagued with wars. Pellegrino seems to have put forth the most modest and sensible position in this regard by noting that, "Except in the most extreme exigencies, the physician remains a physician always."[54] What exactly qualifies as a "most extreme exigency" is debatable. One example that warrants some discussion in this regard is military physicians participating in torture. This topic shall be

addressed later in this section but by all internationally accepted ethical standards it does not fall into the category of a "most extreme exigency."

A brief mention of the principle of impartiality will be useful here in this discussion on IHL. Impartiality refers to treating patients impartially on the basis of need alone, not religion, race, gender, age, or military loyalty.[55] When two patients arrive for treatment, all else being equal, the physician must treat the patient that is in a more severe state first. Contrary to Gross, Toebes has argued that, "Undoubtedly, war raises tremendous moral dilemmas, but….there is no moral justification for giving priority to one's own soldiers…."[56] Regardless of whether the patient is a terrorist, a soldier, or a civilian, need supersedes loyalty. However, the principle of impartiality is often difficult to apply.

When a military physician is asked to treat a terrorist wounded in battle, there may be feelings of anger and resentment toward them. Perhaps soldiers from his or her own nation have died or were wounded in battle and require care but not as urgently as the terrorist laying on the operating table. Understandably, military physicians have a sense of loyalty to their nation and wish to see its values upheld over that of the enemy. Gross refers to this as an "ethic of camaraderie" wherein physicians treat their compatriots prior to treating others, regardless of the severity of wounds.[57] To allow exceptions based upon feelings such as racism or sexism undermines the profession of medicine and the integrity of the physician. However, there are exceptions to this rule that need to be addressed at this point. Rubenstein argues that there are two critical questions that must be answered regarding impartiality. First, how to deal with state demands that conflict with traditional physician obligations. Second, how to protect physicians from being placed in these untenable positions in the first place.[58]

Others have argued that cases of impartiality are not so black and white. Sokol has pointed out that it is morally dangerous to interpret questions of life and death in other cultures and that providing care may actually submit the patient to more harm.[59] Sokol uses two examples on opposite extremes. First, he notes that using coalition MEDEVAC helicopters to evacuate Afghan casualties has the effect of strengthening alliances by visibly caring for all equally. Alternatively, he notes that some US and NATO physicians would not intubate Afghans with burns over 50% of their body. Doing so would prove futile because there would be no possibility for follow up care in village clinics. Coalition forces however, would be transported to their home countries to receive high quality care if they were in the same situation. Thus although impartiality is crucial, cultural context also plays an important role. These types of decisions should not be left to the physician's discretion, although, inevitably such anomalies will occur. Rather, policies should be in place to prevent confusion on and off the battlefield.

Yet another difficult situation for physicians is dealing with the reality of triage. Triage refers to sorting patients into priority of treatments. For example, a mass casualty incident in the civilian realm would rank those that need immediate lifesaving treatment ahead of those whose need is moderate or minimal. Such a sorting might also occur in a military setting as long as there were not scarce medical resources. This categorizing or ranking is done in many different ways by health departments, hospitals, and other medical facilities, but the guiding principle of treating those who are most severe holds true. Beam has pointed out that hard moral cases in triage are relatively rare on the battlefield anymore.[60] Nonetheless, these incidents may occur and as such there are exceptions to this rule. For example, a person for whom treatment is futile is not entitled to immediate treatment if those resources can be provided elsewhere to patients who might benefit from them.

Another exception to the general principle of treating the most severely wounded first is found in the concept of salvage. "Salvage value" replaces claims to quality of life and the right to medical resources during war. This is the case because medical personnel have an obligation to treat soldiers as part of the larger force. Returning salvaged soldiers back to duty as quickly as possible so that they can meet the needs of the military takes priority.[61] Salvage is a concept that was referenced and utilized quite often during WWII. Perhaps salvage is not as applicable in modern warfare. The GWOT has been largely comprised of small-scale battles, both in terms of the number of troops involved and length, as compared to those of WWI, WWII, Korea, and Vietnam. This in turn has altered the nature of trauma care during warfare because there is not the pressing need to return soldiers back to the "frontlines" to achieve victory. Combat medics and nonmedical soldiers alike have received extensive training in recognizing and treating the most common types of wounds on today's battlefield. This includes training to evacuate the wounded soldier within one hour (the "Golden Hour") to increase the likelihood of survivability.[62] Nonetheless, the concept of salvage is pertinent because it highlights that there is a balance in medicine that must be struck during war which is different from peace time military medical ethics. This balance however should not negate core principles of the medical profession. As Nathanson points out, "The statement that ethics is the same in war and peace does not mean that the decision doctors make will be identical. The dilemmas that they face will often differ, but the general principles that will be applied to the decisions will be the same."[63]

E. Torture

Although much has been written regarding torture in the war on terror, this topic warrants some discussion in this dissertation as well because of the profound impact it has had on military medical ethics. Perhaps no ethical issue has been more apparent and contentious than torture

during the last 15 years of the GWOT. However, physician participation in torture is more than just an ethical dilemma for the medical profession. At its core, torture is a violation of the most fundamental of human rights. The *American Medical Association* (AMA) prohibits physicians from participation in torture for any reason but allow physicians to provide medical care and support to victims of torture.[64] Annas has echoed this sentiment, "no physician can take part in any action involving torture or cruel or inhumane treatment or use medical knowledge or skills for punishment."[65]

During the early years of the wars in Iraq and Afghanistan, Secretary of Defense Rumsfeld's response was to argue that physicians were not acting as physicians or caregivers in the process of torture, rather they were acting as soldiers with a specific technical expertise during torture. "Physicians assigned to military intelligence…have no doctor patient relationship with detainees and, in the absence of life threatening emergency, have no obligation to offer medical aid."[66] At risk in this statement is more than just torture but also the physician-patient relationship which this dissertation has already highlighted the importance of. Rumsfeld's comment received outcry from the international community and from medical societies throughout the world. Nonetheless, the defense of the use of torture continued.

There is also evidence to suggest that the use of torture had been systemic by the United States at many times during the war on terror, especially in its early years.[67] Early during the war, Assistant Attorney General Jay Bybee argued that torture could be justified on the theory of self defense to prevent an imminent attack on the United States. Astute scholars once again pointed out that this was a violation of medical ethics and protested the use of torture by physicians all the more.[68] For the Justice Department, any methods that did not cause permanent

organ failure, severe physical damage, or permanent mental harm were considered legal and appropriate techniques for gathering intelligence.[69]

Other scholars pointed out that the justification for torture often relied on faulty evidence. For example, not only is torture always immoral and illegal, but the information elicited during such interrogations is often unreliable. Take, for example, Ibn al-Shaykh al-Libi, a Libyan citizen with ties to *Al-Qaeda*, who confessed to knowledge of WMD's in Iraq while being tortured.[70] Such WMD's have never been shown to exist, yet proponents of torture cited this case as evidence that torture was an effective technique to elicit intelligence that was vital to national security. Some other scholars argue that physicians should participate in torture because the health of the accused terrorist depends upon it. For example, Lepora and Millum argue that occasionally it may be that "the right thing for a doctor to do requires complicity in torture."[71] Their position is that torture is wrong but if it is going to be performed it must be done with physician participation to ensure the safety of the patient. Although a separate but related ethical issue, Gross followed a similar line of argument in regards to force feeding. Physicians, he argued, are morally justified in overriding a patient's autonomy by force feeding for the sake of the safety of the patient and for national security.[72, 73]

The 1984 *UN Convention Against Torture* defines torture as:

> "Any act by which severe pain or suffering, whether physical or mental, is intentionally inflicted on a person for such purposes as obtaining from him or a third person information or a confession, punishing him for an act he or a third person has committed or is suspected of having committed , or intimidating him or a third person, or for any reason based on discrimination of any kind, when such pain or suffering is inflicted by or at the instigation of or with the consent or acquiescence of a public official or other person acting in an official capacity (Article I)."

This sentiment is also echoed in other international human rights law, for example the WMA Declaration of Tokyo- *Guidelines for Physicians Concerning Torture and other Cruel, Inhuman or Degrading Treatment or Punishment in Relation to Detention and Imprisonment*. This declaration states that physicians must not participate in torture and must report suspected abuse when signs and symptoms are present.[74]

One obvious problem is that international codes of medical ethics, including those mentioned in this section, are not legally enforceable obligations on individual physicians. Annas and Grodin have proposed an international criminal prosecution tribunal to address this issue, but this has been met with considerable resistance for a variety of reasons.[75] Rubenstein seems to have appropriately summed up the difficulty with the issue of physician participation in torture by noting:

> "But the decision is "hard" only if one rejects international humanitarian and human rights law, which holds that torture so deeply infringes on human dignity that it can never be justified, even in times of national emergency. A demand that a physician participate in torture presents no "dilemma"; it is always wrong."[76]

III. Just War Theory (JWT)

A. Introduction

General Robert E. Lee once famously stated, "It is well that war is so terrible, or we should grow too fond of it."[77] Such is a good entry point to the discussion on the JWT. The JWT has largely consisted of two parts, the *Jus ad Bellum* and *Jus in Bello*. However, recent scholarship has pointed out the importance of *Jus post Bellum*, referring to laws and actions that are taken after the termination of war and the responsibilities of nations to ensure that parties are

treated fairly.[78] Although this topic shall not be discussed in this dissertation, it is becoming increasingly important in the overall JWT debate. In the end, prudence and experience show that violence alone is not sufficient to attain a lasting peace. Nations must also be willing to improve relationships and reconcile their bitter hatred for one another. If not, war becomes a vicious circle of sorts and all parties become victims under a reoccurring theme.

The history of warfare shows that nations and individuals can be awfully brutal to one another during times of war. The Greeks and Romans sought to put restraints on wartime atrocities by instituting norms such as prohibiting poisoning enemy wells because this act effected whole innocent populations as well.[79] Most historical accounts give credit to Saint Augustine who developed a JWT that was later extrapolated upon by Aquinas. Numerous scholars since then, most notably Hugo Grotius, have attempted to systematize arguments that allowed nations to wage war after their rights were violated.[80] This section of chapter two begins with a discussion of the elements of the JWT. Terrorism is then applied to the JWT to determine how, if at all, it changes its application to the GWOT. Finally, given the GWOT, emerging technologies such as cyber warfare, drones, and robots are discussed and their impacts upon the JWT are analyzed as well.

B. Jus ad Bellum

It is important to note that historically there has always been a presumption against war because of the destruction and devastation that it brought to all parties involved. This is an important point in this dissertation because, as has previously been highlighted, the human person remains the most important element in warfare. The JWT in relation to the *Jus ad Bellum* (war-decision law) is applied at the strategic level of warfare, meaning it is most appropriately

dealt with by the higher echelons of leadership in the government and military. Thus, it might be tempting to suggest that individual soldiers should remove themselves from the discussion as to whether or not the war they are fighting is just. This however would be counterproductive. Soldiers that are mere puppets of a nation undermine the integrity of the human person. Although the discussion on JWT in this section of the dissertation is focused at the theoretical level, it is important to note that the soldiers also have much to contribute to the debate as well.[81] Of course, the opposite extreme would be equally dangerous and undermine the military and the safety of the nation if soldiers began refusing to obey lawful orders. A well informed society and its soldiers all have a valuable part to play in the discussion of when a nation is considering whether or not to wage war.

Aquinas took the initial presumption against war based upon the Christian principle that killing is evil and sinful. This theological principle however, should not restrict modern decision makers from using the conditions set forth in the JWT as a gauge for whether or not to wage war.[82] Indeed, this dissertation asserts that the JWT is applicable and useful to modern warfare as well even if its foundation rests on religious views. Much domestic and international law throughout the world is based upon religion and these laws are often reinforced by secular international humanitarian law as well. Moreover, the JWT can function as a checklist in many respects. Although this position is not accepted by all scholars, it is the majority opinion for entering into a discussion on war.

This dissertation adheres to Hurka's summary of the JWT in which he argues that:

> "Just war theory lays down a series of conditions that a war must satisfy to be morally justified; if it violates any of the conditions it is wrong, although how wrong it is depends on

how many conditions it violates, how important they are, and how seriously it violates them."[83]

Many factors must be taken into consideration when utilizing the JWT as a moral and ethical foundation for a discourse on war. *Jus ad Bellum* is the first component of the JWT. This section shall address the six major conditions of the JWT, although for Aquinas, it initially only consisted of these three conditions necessary for a society to wage war (*ST II-II, q. 40, a. 1*):

1. *Competent Authority* – the legitimate government must give authority to commit the nation to war.
2. *Just Cause* – self defense of the nation or to correct and punish an injury.
3. *Right Intention* – war must be waged without hatred to establish a just and lasting peace.

In regards to *competent authority*, one clear example would be World War II, in which the United States Congress formally voted for and declared war. One issue with competent authority however, particularly in the United States, is how much latitude is granted to the President to deploy troops without the consent of Congress through a formal declaration of war. The *War Powers Resolution* (WPR) was drafted by Congress to limit the nature and scope of the President's authority in these types of situations.[84] Jensen has argued that the current language of the WPR is no longer effective because it was written before major technological advances came about that can now limit or eliminate the need for "boots on the ground" to be deployed.[85] This topic of emerging technological advances, in particular weapons and HE, shall be discussed later in this chapter. Suffice it is to say here that the competent authority of the nation must commit the nation to war. Private individuals are forbidden from waging war, unless a case of necessity exists, because these individuals have recourse to the legal system and other nonviolent means of having their rights restored or injustices justified.

Although the most obvious example of a *just cause* is self defense, some recent scholars have argued for an expansion of this condition. "There is an increasing recognition that military intervention against repressive, genocidal regimes may meet the condition of just cause, even if the intervening power has little or no claim to self-defense."[86] At the beginning of the GWOT, the "Bush Doctrine" put a new spin on the condition of just cause. This ideology held that the United States now had the right to use preemptive measures in self defense in order to prevent and eliminate a threat that although not yet operational, could do significant harm in the future if left unchecked.[87] This position remains the center of much debate because traditionally an act of aggression had to have already occurred or was imminent for the JWT to be invoked.

One distinction that must be made clear is the difference between preemptive and preventative. Preventative use of force refers to the use of military action in "anticipation of harmful actions that are neither presently occurring nor imminent."[88] Preemption, on the other hand, deals with action taken to thwart an immediate threat, "where there is no time for diplomacy to be attempted, and where the action is limited to reducing that threat."[89] Brown argues that preemption is an extension of the right to self defense when indisputable evidence exists that there is an "imminent threat of unprovoked aggression."[90] The distinction between prevention and preemption lies in the notion of immediacy.

If the notion of immediacy is abused, there is the serious risk of a war actually becoming counter-productive and leading to instability and insecurity in an area due to the backlash against the nation undertaking the just war in question. Betts argues that, "Preventative war is almost always a bad choice, strategically as well as morally. Preemption is another matter—legitimate in principle and sometimes advisable in practice."[91] The notion of immediacy has also been

discussed at length by Walzer, who argues in his influential book *Just and Unjust Wars*, that only aggression can justify war.[92]

Some scholars have argued that the condition of just cause takes priority over all the other conditions because the other conditions cannot be satisfied unless a just cause is apparent. Along these lines McMahan has argued that prevention of future aggression may be a just cause for war based on the analogy of a criminal conspiracy.[93] Namely, that the wrong that is being undertaken involves parties that are intending and preparing to commit a crime by, for example, stockpiling weapons. Other scholars have argued that this position is too permissive. For example Hurka argues, contra McMahan, that a merely preventative war based upon disarmament of weapons does not satisfy the just cause condition of the JWT because no aggression has been committed yet.[94]

The third and final condition of the JWT for Aquinas is *right intention*. O'Brien and Arend note that three elements must be met here. First, the nation waging war must limit its goals to those set out in the just cause and nothing more. Second, the nation must not wage war out of hatred or revenge. Finally, the nation must wage war so that a just and lasting peace can be accomplished.[95] These are important elements because nations must coexist again after war is over. Nations must set aside past and present grievances and give way to an understanding that promotes the common good. War should never be undertaken out of a rash hatred for another nation or revenge. It should be undertaken out of a desire and necessity for justice. In this way, war will never become the "easy way out." Rather, "resort to war will always require justification."[96]

Since Aquinas first articulated the JWT in relation to *Jus ad Bellum*, three other conditions have been included as necessary for a society to wage war:[97]

4. *Probability of Success* – the war must be reasonably expected to succeed.
5. *Proportionality* – the war should only be waged if the good to be achieved is proportionally greater than the harm that will result from war.
6. *Last Resort* – reasonable attempts at thwarting war through non-violent means should be exhausted first.

If waging a war is not expected to bring about successful military objectives then it must be avoided. This determination must be made at the beginning of the war and throughout the entire course of the war because the *probability of success* may diminish to the extent that what was a just war is no longer just in waging.[98] This condition also highlights the importance of having a clear goal in mind and the right intention for waging war. Applying this principle to the current GWOT, George sums up the scenario quite well, "In a war against terrorism, the requirement of a 'probability of success' means that force, especially deadly force, exercised in line with all other requirements of justice in warfare, must have a reasonably good chance of succeeding in preventing future terrorist acts."[99] Much more can be said on this topic, especially in relation to HE in the military. However, here it suffices to note that HE may increase the probability of success but there may be other unforeseen costs that may not come to light until after HE have been implemented. This idea shall be discussed throughout chapter five of this dissertation.

Much has been written about the topic of *proportionality*, especially in light of the GWOT. Proportionality is often a moving target, of sorts, because it is extremely difficult to determine what the consequence of war will be. Nonetheless, "responsible authorities must make a prudent judgment regarding the probable outcomes of going to war."[100] Proportionality refers

to the condition that only the use of force necessary to achieve a just cause should be used. Any additional force beyond what is necessary would render the action unjust.[101] Some scholars have argued that proportionality is seldom precise and thus all that can be done is a best guess estimate of the consequences that will be produced.[102] Other have argued against this pessimistic view and hold that proportionality judgments can indeed be made prior to waging war in light of the relevant facts available.[103] This dissertation holds that judgments on proportionality can be made before war is waged. Moreover, and perhaps more importantly, judgments must be made *continually* throughout the course of the war. McMahan has highlighted this point by undertaking an evaluation of proportionality in the war in Afghanistan.[104]

A nation such as the United States, clearly has the right to determine whether or not it will wage a just war based upon its own evidence and evaluation. Increasingly however, authors have called for more international involvement, such as presenting evidence to the UN prior to declaring war to keep a nation accountable for its actions.[105] This highlights the final condition of the JWT. The *last resort* condition requires that all other non-violent means of avoiding war be attempted first. Most obviously this refers to diplomacy but it can also include other actions such as economic sanctions. As a seventh condition of the JWT, the Catechism of the Catholic Church notes that, "the damage inflicted by the aggressor on the nation or community of nations must be lasting, grave, and certain."[106] This comes from a theological perspective but has value for the JWT as well because an attack from an aggressor that is not grave and does not have lasting implications is not sufficient to wage war. This concludes the discussion on the first part of the JWT. The second part of the JWT deals with *Jus in Bello*, that is, conduct during warfare and the rights and responsibilities of parties involved therein.

C. Jus in Bello

Conduct on how war is waged in also governed by the JWT, although this too developed after Aquinas. The two main principles that apply to JWT during *Jus in Bello* are the principles of proportion and discrimination. The principle of proportion is similar to the condition of proportionality during *Jus ad Bellum*, but it is also distinct. During *Jus ad Bellum* deliberations, the condition of proportionality refers to means being proportionate to the end achieved in light of the probability of success of the overall war plan. During the *Jus in Bello* deliberation, proportion refers more to ground level tactics and strategies that must not cause more harm than benefit.[107] For example, attacks on targets that are only minimally significant to the enemy but that come with large scale collateral damage to noncombatants would not be morally permissible under the principle of proportion.

Modern warfare creates issues where both the principles of proportion and discrimination are blurred in light of many external factors. The principle of discrimination is a moral principle that bars "direct intentional attacks on noncombatants and civilian targets."[108] Such attacks would be murderous and morally impermissible. Killing is permitted under the principle of discrimination but those killings must not be directly intended. In describing discrimination, some scholars such as Walzer make recourse to the principle of double effect to help identify the key issues involved. Walzer defines the principle of double effect as:

> The intention of the actor is good, that is he aims narrowly at the acceptable effect; the evil effect is not one of his ends, nor is it a means to his ends, and aware of the evil involved, he seeks to minimize it, accepting costs to himself.[109]

O'Brien and Arend argue against the principle of double effect being absolute but nonetheless see the principles of proportion and discrimination as related. In doing so, they argue that collateral damage is an unfortunate and unavoidable part of *Jus in Bello*. "Collateral damage to noncombatants and civilian targets must be proportionate to the legitimate military necessities of the action."[110]

D. International Law

Every nation that wages war must continually ask itself, is war being fought in an ethical and just manner? There is much international law that is directed toward this question. The international law referred to here is separate from the principles of proportion and discrimination but is often based upon them. International law enriches the *Jus in Bello* by setting limits to combat and warfare based upon human rights.

Broadly speaking, there are three distinct actors that play a part in war according to the 1949 Geneva Convention.[111] First, noncombatants are those who take no active part in the hostilities. This would include civilians as well as wounded soldiers and enemy POW's as long as they no longer bear arms. Second, combatants refer to those that bear arms and belong to militaries that are in acceptance of international law during war. These would include all uniformed soldiers and reservists. Regardless of what decisions leaders make to wage war, soldiers on both sides have equal moral worth and status. Many scholars have pointed out that this definition of combatants excludes terrorists in view of the fact that they are not in compliance with international law because, for example, they deliberately target civilian populations rather than other nations' combatants.[112] The third and final actors are nation-states. These are internationally legitimate and recognized sovereign bodies.

When enacted, one of the main purposes of the Geneva Conventions was to protect victims of war, especially those deemed to be wounded and sick. The 1949 Convention was adopted by the overwhelming majority of nations. The 1977 Protocols, however, were not adopted by the United States because of objections to the wording of the protocols. Specifically, the United States argued that the requirement to provide equal care to soldiers, civilians, and POW's during warfare would be untenable.[113] Nonetheless, the US still remains bound by the bulk of the Geneva Conventions. Vollmar summarizes the Geneva Conventions to encompass four main principles. Namely, that the wounded and sick should always be respected, protected, cared for, and treated humanely.[114]

Other areas of international law directed at conduct during war include the control of the means and methods of destruction and sanctions for violations of the laws. These are often referred to as the Laws of Armed Conflict (LOAC). Violations of these international laws may take place in war crime proceedings for example. Some examples of laws against the means and methods of destruction include the *Biological Weapons Convention of 1972* and the *Chemical Weapons Convention of 1993*. Torture or subjecting wounded or POW's to any type of human experimentation is also prohibited under the Geneva Conventions. Soldiers in combat are also governed by Rules of Engagement (ROE) that may differ based upon the type of mission set that they are involved in. This is especially important to the discussion given the complex nature of modern warfare. HE in the military, if implemented, would also likely be subject to new international laws governing their use and application. This topic shall be addressed in further detail throughout all the remaining chapters of this dissertation.

E. New Wars, Old Rules?

Given the complexities of modern wars, many scholars have called for a new set of conditions on the JWT. Rosenthal for example, argues that the JWT needs to be considered in light of "new circumstances—specifically the challenge presented by a nonstate actor with an avowed goal of violating just about any rule that [society] holds dear."[115] The issue of nonstate actors is particularly troublesome given that terrorists may merely be taking refuge in nations unbeknownst to, and without the sanction of, the government of that nation. Moreover, right intention and probability of success create dilemmas as well because the GWOT is not a war against another nation per se but in many ways a war against an ideology. The United States and other NATO nations have relied on modern technologies to gather intelligence and destroy terrorist networks to thwart future attacks. These actions do not come without serious ethical questions however. "The inauguration of air warfare, the advent of the nuclear age and the increasing sophistication and destructive capability to take war to the adversary's homeland and domestic society raises profound moral questions."[116]

Fotion has argued that the JWT as we know it should be expanded and a new irregular JWT should be used at times instead. He argues that the traditional JWT (as has been discussed above) should be used when dealing with the ethics of traditional wars between states. An irregular JWT (JWT-I) should be used when dealing with the ethics of modern wars that involve nations and nonstate actors.[117] Coleman has criticized Fotion's position claiming that nothing new or substantive has been added to the debate and that all of the conditions of the traditional JWT can still be applied to irregular and asymmetrical modern wars.[118] A prudent compromise seems to be keeping the JWT as it is in substance and changing some of the international LOAC instead.

This position has been put forth by Sulmasy who argues for a number of changes, but in particular an expansion of protections to accused terrorists such as those at Guantanamo Bay.[119] This position has value because these accused terrorists do not fall under the definition of "combatants" as termed by the Geneva Conventions. Expanding that definition to include some additional rights will eliminate some of the criticism that surrounds the tactics of the US and in turn create a more positive image of the US in the eyes of the rest of the world. Sulmasy terms this LOAC against international terrorism (LOAC IT) because non-governmental political organizations, terrorist organizations, and interest groups are waging war against legitimate nation-states through terrorist activities.[120]

Wolfendale argues that the JWT is an acceptable moral theory to apply to modern wars. However, she also holds that once the JWT is applied it becomes apparent that the GWOT fails in being a just war. Her position rests on the belief that the GWOT cannot satisfy the condition of probability of success because putting an end to all terrorist threats is an impossible goal to achieve.[121] On the same topic, Kaldor has put forth the "new war hypothesis" that characterizes post Cold War conflicts and international terrorism as new wars that are more atrocious and prolonged than traditional wars between nation states.[122]

F. Emerging Technologies

Emerging technologies are challenging many of our time honored principles of the JWT and of modern LOAC. Lucas argues that some of these emerging technologies offer the prospects for reducing the indiscriminate casualties of war and at the same time allowing nations to conduct more peacekeeping missions instead of combat missions.[123] Examples such as cyber

warfare, unmanned aerial vehicles (drones), and biological and psychological enhancements of soldiers, all force society to think of warfare and weapons in a new light.

Forge has made an important point in regards to weapons innovation of these emerging technologies. "The point to stress at the outset is that weapons research and weapons innovation, unlike weapons manufacture, has an open-ended future in that there is radical uncertainty as to how, where, and when the designs will come to be implemented and those products used."[124] This dual use issue has always been a concern for scientists and military leaders because ultimately it is not the technology itself that is evil, but how it is used and implemented is what often creates the ethical dilemma. The distinction is an important one however because, as the bombings of the Boston Marathon showed, simple items such as pressure cookers can be used by terrorists. As Malsch points out, this distinction is often "blurred because of trends in dual-use sciences and technologies that are ever-cheaper and more easily available for military and terrorist uses."[125]

i. Cyber warfare

Terms like 'riskless' war or 'cyber' war are already becoming part of the common language used to describe warfare. In fact, cyber warfare has forced leaders to rethink when nation states are actually in armed conflict or at war with each other.[126] Allenby makes an important point related to this as well, "It is difficult to say when a country actually has been attacked, or what level of proof regarding an attacker's identity is required before a response would be deemed to comply with the laws of war."[127]

Others have addressed this topic and argued that in many ways emerging technologies force society to acknowledge the lines of warfare may no longer be drawn along geographic

borders but instead in terms of cyber borders.[128] Moreover, leaders will need to reevaluate principles of the JWT, such as proportionality or probability of success, because the impact of cyber attacks on a military and a nation could be profound. One recent study suggests that 140 nations already have or are actively pursuing the capability to launch a cyber attack through their military.[129] As Jensen has pointed out, "Emerging technology will require emerging law."[130]

ii. Drones

Drones have already become an enormous part of modern warfare. Drones are common place in the arsenal of the United States and other NATO nations that are conducting the GWOT. They serve multiple purposes including, delivery of weapons systems, and intelligence, surveillance, and reconnaissance (ISR) platforms. Drones can remain airborne for days at a time, refuel in mid air, and are operated from a secure remote location. Drones often have the benefit of not needing to deploy troops into hostile territories. This in turn keeps troops from direct harm. If troops are deployed on the ground, drones can provide close air support and monitor the areas surrounding troops to protect them from harm. In many ways, drones are similar to long range missiles in terms of weapons delivery, albeit much more precise and accurate. However, they often operate in foreign airspace and they give new meaning to the term 'riskless warfare' because they are operated remotely. The mission areas in which drones have the most utility are those areas that are especially dangerous for troops and run the risk of loss of life.[131]

Anderson has argued that, "drones are a major step forward toward much more discriminating use of violence in war and self defense—a step forward in humanitarian technology."[132] Yet the collateral damage to innocent civilians throughout the world also must be considered when addressing the value of drone technology. The United States has been subject to

much domestic and international criticism for failing to adhere to a more strict interpretation of the principle of discrimination. Undoubtedly, drones will be used more frequently in the future, yet it does not appear they will entirely replace the role of the human person. Soldiers will still be required to do combat missions for high value targets (HVT's) because intelligence gathered from drones may not always be reliable and could also be corroborated with human intelligence (HUMINT) gathered by soldiers on the ground. Brunstetter and Braun's assessment of drones in relation to the JWT is precisely on point in this regard. "Just war theorists need to recognize that drones change the nature of warfare."[133]

Related to drones is the use of robots in combat. Much has been written on this topic but it is beyond the scope of this dissertation. Nonetheless, some notes on it are appropriate. Robots have the potential to "replace the human soldier in an increasingly range of dangerous missions: from tunneling through dark caves in search of terrorists, to securing urban streets rife with sniper fire, to patrolling the skies and waterways where there is little cover from attacks."[134] This is a very futuristic outlook and all evidence from the US Department of Defense (DOD) suggests a cautious approach is being undertaken that will not see robots replace humans anytime in the near future.[135] Nonetheless, robots have already taken on a large role in the GWOT. For example, the use of robots to find and eliminate the threat of IED's has proven to be extremely useful in the reduction of casualties in the wars in Iraq and Afghanistan. Lin appropriately argues for precaution in this matter because there are many values at stake beyond the ethics of whether or not robots would be in compliance with the JWT. These include issues such as maintaining the ability to win over the hearts and minds of the people and also not becoming overly reliant on robots to do work that should more appropriately be done by humans.[136]

IV. Human Enhancement: An Overview

A. Introduction

This final section of chapter two outlines a brief overview of HE. This outline will be expanded upon throughout the course of this dissertation as it pertains to ethically assessing the use of HE in the military. This section begins with a discussion on the treatment-enhancement distinction. This distinction has much to offer the debate and is valuable but needs to be nuanced with a discussion in terms of *type, degree, and context*. It is also necessary to address the concept of *normalcy* in the HE debate and point out the difficulties involved therein as well. Finally, this chapter will conclude with a discussion on HE in the military and what differentiates them, both morally and ethically, from HE in a civilian setting. This will play a crucial role in determining if HE in the military possess a stronger moral claim to use than HE in a purely civilian setting.

B. The Treatment-Enhancement Distinction

The treatment-enhancement distinction (also referred to as the therapy-enhancement distinction) has been used in a variety of contexts. Resnik has used it in the debate surrounding human genetic interventions.[137] Although the distinction has many weaknesses, Allhoff has pointed out that it does have the value of highlighting the importance of *type* and *context* when debating about the ethics of HE.[138] These terms shall be discussed later in this section. Here, however, it is important to highlight Daniels' famous distinction because it has arguably become the most widely accepted:

> The treatment-enhancement distinction draws a line between services or interventions meant to prevent or cure (or otherwise ameliorate) conditions that we view as diseases or disabilities

and interventions that improve a condition that we view as a normal function or feature of members of our species.[139]

Although this definition has its limits, it does provide an entry point for the debate on HE.

C. Defining Human Enhancement (HE)

In a very general sense enhancement is nothing more than increasing the value, quality, extent, or magnitude of something. Based upon this definition, reading to develop cognitive abilities, eating healthy foods to lower cholesterol, or walking around the block as a form of exercise would all be considered human enhancements in a very generic sense. These enhancements are not morally problematic. It is tempting to take the next step here and note that perhaps the *natural v. unnatural* debate is an adequate gauge for drawing a distinction between what is a morally permissible enhancement or not. But this distinction is untenable because the line between natural and unnatural seems to be quite murky. If walking is a natural enhancement, then is using a pair of custom made inserts in your walking shoes an unnatural enhancement? If eating is natural, then is eating with a fork or spoon unnatural? If so why? These examples, although slightly ludicrous, highlight that the natural v. unnatural distinction is too ambiguous and arbitrary to be useful in the HE debate. The distinction may be helpful when dealing with extreme circumstances but not in the gray areas of the debate, which is often where HE tends to be discussed.

Another way to approach the treatment-enhancement debate is to discuss it within the context of what it means to be *normal*. Daniels introduced this in his "Normal Function Model" in which he argues that medicine should have the task of keeping people functioning as close to normal as possible based upon what is species typical and on the statistically-normal range of

functioning for the individual person.[140] Speaking of the treatment-enhancement debate from a *normal* point of view has the advantage of being able to use statistics that are based on typical human functioning to determine when an intervention would more appropriately be considered normal (treatment) v. abnormal (enhancement). There are a number of issues with this concept however. Hogle has pointed out one of the most difficult problems with this distinction is that statistics fail to take into consideration how a society's cultural and religious beliefs impact the concept of normal.[141] Similarly, discussions on "normal" also have difficulty categorizing individuals such as those that are "at risk" or "prone" to diseases.[142]

This dissertation adheres to a definition of human enhancement from Juengst that is also accepted by HE experts such as Lin et al. HE are medical or biological interventions introduced into the body designed "to improve performance, appearance, or capability besides what is necessary to achieve, sustain, or restore health."[143, 144] While this definition encompasses much of what is held to be an enhancement, it admittedly leaves open the potential for disagreement. The World Health Organization (WHO), for example, defines health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity."[145] One group of scholars notes that under these definitions vaccinations might be deemed as enhancements.[146]

Vaccines are preventative and as such are not directed at a particular medical condition. This could bring into question the obvious problem for public health officials promoting vaccinations and thus human enhancement in the strict sense. One solution that seems practical is to simply admit that enhancements (as defined here) may be morally permissible at times. At other times they may be morally impermissible. This dissertation accepts this premise and shifts emphasis to the next appropriate step of speaking of HE as they relate to *type, degree,* and

context, which shall be further addressed in chapters four and five. As the preceding paragraphs highlight, there is much insight that can be gleaned from the treatment-enhancement distinction. Yet the distinction is also the center of much contention that may result in an unnecessary impasse in the debate at times. By avoiding getting bogged down in the definitions of the treatment-enhancement distinction, the focus can shift to the larger contextual application of HE. This shift requires many factors to be taken into consideration in order to formulate criteria for whether or not HE in the military are morally permissible. These factors include military ethics (the topic of this chapter), human dignity and human rights (chapter three), and the *type*, *degree*, and *context* under which the HE is to be implemented (chapters four and five). Ultimately, the criteria must undergo rigorous scrutiny in order to determine if they are an adequate gauge in this discussion and if they uphold human dignity. This is not to dismiss the treatment-enhancement distinction as useless in the discussion of HE. It is an excellent starting point, but at some juncture in the debate a shift must occur in order for there to be progress. That shift, this dissertation contends, lies in the concepts of *type*, *degree*, and *context*.

i. Type

The *types* of HE are related to the four forms of cognitive (CE), physical (PE), emotional (EE), and moral (ME) that shall be presented more thoroughly in chapter four. Indeed there is overlap between the forms, but these forms can also be narrowed to be more specific. For example, the *type* of genetic enhancement could fall under physical enhancement (PE) but could also be narrowed even more to differentiate between somatic and germ-line enhancements. What needs clarification however is how and to what extent types enter into the ethical debate on the moral permissibility of HE. Using the genetic example above, a somatic enhancement would only physically and anatomically affect the individual. Germ-line genetic enhancements would

affect not only the individual but alter the gene pool of future generations as well.[147] One of the ethical implications here is the shift from a debate on individual autonomy to a debate on harms to future generations. Thus the concept of *type* seems to matter especially when dealing with HE that are end centered and aimed at specific desired results. These HE bring in ethical questions that society has a vested interest in as well.

ii. Degree

Selgelid has pointed out the value of taking the concept of degree into consideration. He notes that rather than dismiss the treatment-enhancement distinction, it should be recognized that there is a spectrum to disease and it is valuable to speak of it in terms of degree.[148] Some scholars have attempted to show the concept of degree through the "Paradox of the Heap" or through the example of baldness.[149] The example contends that there is no fine line between being bald and not bald. At what point is the individual just losing their hair but not yet bald? To speak of baldness in terms of degree is useful here. There is clearly a difference between someone who has a full head of hair and someone who has perhaps, just small patches of hair in certain spots or a receding hairline. Although there may or may not be a moral difference, there is still a physical difference which is important. In the same strain, there are degrees of HE that must be taken into ethical consideration.

Take the example of cognitive enhancers such as *modafinil* or Ritalin. Adult A is a sub-average college student who has been prescribed Ritalin to combat a severe case of ADHD. After a month of use, adult A's attention span increases and he begins to show a significant increase in his college test scores without changing anything else in his lifestyle. Adult A has become a superior student. Adult B also shows symptoms of ADHD but his case is only diagnosed as mild

and his dosage of Ritalin is considerably less than adult A. Ritalin helps adult B with social functioning and self control but his college test scores only marginally increase and he remains an average student. Adult B decides to double the amount of time he studies and in turn is rewarded with test scores near, but not surpassing, adult A. In this example there is a difference in *degree* of severity of ADHD. That degree of severity can also create a moral dilemma however, especially if adult B decides to increase his dosage until he also is able to become a superior student with high test scores (assuming it is a possibility). Schermer has added to this discussion and notes that one of the values at stake here is that cognitive performances are not only valued objectively on their score but also valued for the manner in which they were achieved.[150] Some might look upon adult A as a cheater, but it is not clear if that categorization is appropriate given that all adult A did was take a medication for an underlying condition and did not change any of his other habits, including studying. Alternatively, might adult B be considered a cheater if he doubles his prescribed dosage, continues to study at double his original amount, and now achieves scores that are equivalent to adult A. Of course, there are many variables that can be debated in this example but it serves its purpose by highlighting the concept of degree. Thus to speak of HE in terms of *degree* will be extremely important throughout the remaining chapters of this dissertation.

iii. Context

As the previous example of *degree* pointed out, *context* is also important. HE such as cognitive pharmaceuticals could be used in the civilian context for increased academic performance. Anabolic steroids might also be used for increased physical performance in the context of sporting competitions. Both of these examples make claims on individual liberty as one of the reasons why they should be morally permitted. The use of *Propranolol* for the

treatment of PTSD in the military or civilian setting could be argued to be more therapeutic in nature rather than an enhancement because its use is meant to treat an underlying condition. At the same time *Propranolol* has shown to be effective in preventing PTSD if taken hours before a likely traumatic event.[151] The latter example is more likely to be controversial in the military setting because the HE (*Propranolol*) is not therapeutic in nature but rather preventative and not without possible side effects that require a risk-benefit analysis. Military leaders might be more likely to approve of this HE, even with some unknown side effects, if soldiers were on the cusp of entering into a fierce combat scenario. However, they might be more reluctant to approve of it in a different context.

Gross argues that in many ways HE in the military are not in any way related to therapy but instead are focused on improving "a soldier's function while reducing risk to life and limb."[152] HE in the military raise ethical questions that are often rare to non-existent in a civilian setting such as a soldier's right to refuse a HE, forced participation in HE research, issues of moral agency, and unknown side effects. Many of the HE examples proposed in this dissertation will not have any semblance of being therapeutic in nature for the soldier. According to Moreno, DARPA is already conducting extensive research under its Metabolic Dominance Program, which is aimed at producing pharmaceuticals that would allow soldiers to exhibit "continuous peak physical performance and cognitive function for 3 to 5 days, 24 hours per day, without the need for calories."[153]

The moral permissibility of these types of HE in the civilian setting would be extremely problematic and claims would be made to individual liberty for their justification. Yet no such claim is being made in the military setting. Rather, these types of enhancements are being put forth under the auspices of national security. A report put out by the JASON Program Office

points out that the types of HE put forth by DARPA could alter the balance of military effectiveness throughout the globe. Hence, the report called for a need for global monitoring and the importance of being adequately prepared to counter a HE that might be launched by an adversary of the United States.[154] The greater question that might be asked at this point is this, are there more efficient or safer non HE alternatives available that can counter an adversaries use of HE in this situation? This dissertation does not seek to answer this particular question here. Rather it is meant to point out how *context* can alter the approach to how HE in the military are framed. In conclusion, the focus here has been on outlining HE and noting the importance of *type*, *context*, and *degree* in ethically assessing the use of HE in the military.

Conclusion

Chapter two highlights many general topics related to the military and its role in society. Section I on military culture is important because it strengthens the argument for the moral criteria that are proposed in chapter five. Specifically, it shows what is at stake if HE in the military fail to uphold moral agency and military values. Section II of this chapter focuses on military medical ethics. Topics such as the physician-patient relationship, dual loyalty, torture, and international law all show the importance of upholding the integrity of the medical profession in the military. Section III breaks down the major components of the JWT and points out the profound impact that emerging technologies are having on modern warfare. One such emerging technology is HE which is the topic of Section IV. HE is outlined and finally the impact of HE on the military is briefly discussed. Chapter two provides a bridge, of sorts, to chapter three which focuses on human dignity and human rights as crucial moral principles upon which this dissertation rests.

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Chapter Three: Human Dignity, Human Rights, and Human Research

Introduction

Chapter three begins with an account of human nature. This is crucial because it lays the foundation for a discussion on human dignity. In order to make a reasoned argument for the moral criteria that shall be proposed in chapter five, it is essential that some preliminary notes be set forth regarding human dignity. Although there is a rich body of work on the topic of human dignity, especially in relation to HE, the aim of this chapter is not to be exhaustive but to offer a robust examination of the topic. This chapter lays out some of the rival arguments and attempts to address what is at stake if human dignity is not firmly established as a guiding moral principle in the HE debate.

In 2008 the President's Council on Bioethics released an important collection of essays entitled, *Human Dignity and Bioethics*. Section I of this chapter draws partially from this seminal work and lays out competing theories in the debate over what is the basis of human dignity and what moral value should be afforded to it. Also of importance is a discussion on the emerging field of biopolitics, which involves bioconservatives and transhumanists debating what legal and moral limits should be placed on HE research and use.[1] Ultimately, the value that a society places on human dignity in many ways becomes a gauge of what sorts of rights it will guarantee to its citizens, which in turn impacts human flourishing and ultimately the common good.

Although it is not the intent of this chapter to offer a comprehensive list of human rights, it is important to note some of the generalities that they have in common with each other. Many of these human rights that flow from human dignity have been codified in international treaties such as the *Universal Declaration of Human Rights (UDHR)*, and the *UNESCO Universal*

Declaration on Bioethics and Human Rights (UDBHR). Section II of this chapter draws upon these treaties and other sources to highlight the importance of having human rights norms in place in order to protect all individuals, especially those involved in HE research. Section III outlines past human rights abuses involving human subject research, focusing particularly on those that were committed against members of the military. Similarly, laws and policies related to HE research will be discussed in section III as well.

Of particular importance in this final section will be a discussion on paternalism in the military and the role it plays in obtaining informed consent from soldiers. Informed consent serves as one of the four moral criteria that will be proposed in chapter five. As previously noted, this dissertation takes a viewpoint specifically meant to enlighten a perspective from the United States. However, as this chapter hopes to make apparent, human dignity and human rights must be applied equally to all individuals if there is to be any hope for meaningful progress between nations to either eradicate war or severely limit its devastating impacts. Moreover, they must be applied equally so that all research subjects who test HE and all soldiers that may eventually use HE are protected from unnecessary harm.

I. Human Dignity

A. Human Nature and the Human Person as Foundational

In debating what is the essence of human nature and whether HE threaten to alter that essence, Caplan rather scathingly notes,

> "Is there a nature that is common to all humans both those that exist now and those that have existed in the past?....one can conclude that we have been shaped by a casually powerful set of genetic influences and selection forces and still remain skeptical as to whether these have produced a single 'nature' that all members of humanity possess....If one surveys all humans,

> across cultures, those of all ages and varieties of congenital defects, and those from different times in the past it becomes hard to believe any single trait is defining of human nature. Without a demonstration of 'nature' there is no basis for the claim that change, improvement, and betterment always represent grave threats to our essential humanity."[2]

The task of whether or not there is a common nature that all human beings share has been attempted by numerous philosophers throughout the history of mankind. With the rise of rapidly emerging technologies, such as HE that have the potential to alter humanity, the debate has been intensified all the more. The interpretation that this dissertation adheres to in regards to human nature and human dignity is in contrast to that of Caplan and is a blend of sorts from a variety of philosophical theories that shall be fleshed out in the following pages. As Caplan's quote above makes apparent, the theoretical and metaphysical arguments for the basis of human dignity, and by extension human rights, can be points of contention in the debate. However, the most important practical aspect, for the sake of this dissertation and for the HE debate as a whole, is the recognition of human dignity as foundational. The details will always be debated, but commonality on this moral principle is essential. Nonetheless, competing claims such as Caplan's must be addressed as they often hold value and contribute to the dialogue.

Historically, Plato throughout his work *Phaedo* refers to "rationality" as being a distinguishing characteristic of a human.[3] Aristotle in the *Nicomachean Ethics* follows a similar line of reasoning by noting that there is a "rational principle" that distinguishes humans from other entities.[4] This led to Aristotle famously defining the human as a "rational animal." Aquinas followed Aristotle's view on rationality and held it in high regard because it allowed individuals to have "dominion over their own actions" (*ST I, q. 29, a. 1*). Clearly, the importance of 'rationality' as being a distinguishing feature of the human person is well documented in the history of philosophy. The following paragraphs hope to show that this historical account is

relevant to this day and can serve as a basis for reasoned arguments against a variety of positions such as Caplan's.

Some scholars claim that there is nothing unique about human nature and therefore alteration of it by means of HE is morally permissible. Buchanan for example has argued that there is nothing wrong with altering our human nature because our human nature contains both bad and good characteristics.[5] A common response to this line of reasoning is often referred to as the 'don't endanger human nature' argument. The argument holds that there is something good and unique about human nature and therefore science should not alter it or attempt to gain mastery over it.[6] It is important to understand that bad and good characteristics of human nature have developed in unison with each other. Furthermore, there is a connectedness to human nature that scientists are only beginning to grasp. For example, recent evidence suggests that negative emotions are actually essential for mental health.[7] This connectedness has implications for philosophers who study human nature from a metaphysical perspective as well. If HE were to alter just one portion of our human nature, say violence, then it might also result in harm to the peaceful side of human nature as well. As Koch notes, "Evolution is always communal and social…Evolution is not the simplicity enhancement enthusiasts promote as a certainty. It is instead, a complex and fuzzy process in which unforeseen resources may exist in previously ignored niches."[8]

Admittedly, there are indeed bad and good characteristics of human nature, but human nature is more appropriately understood as a whole, rather than individual parts that can be retained or discarded. Kass alludes to such an argument but does not fully develop it when he speaks of human goods and aspects of our humanity being threatened by HE.[9] To be fair, this is a difficult position to hold because it connects the bad and good characteristics of human nature as

mutually reliant upon each other. Taking this position to the extreme could very well result in halting all research and progress in the field of HE. Such an argument requires distinguishable boundaries as to what is or is not considered a HE if it is to be useful in the context of the HE debate.

An appropriate entry point to the current philosophical discussion on human nature and the human person, but not without disagreement, has been proposed by Eberl who points out that, "By and large, contemporary philosophers have perpetuated a thesis that a person is any being that exhibits *a capacity for self-conscious rational thought and autonomous volition*, and who is thereby *a member of the moral community*."[10] To speak of capacity is important because it holds that those individuals, for example with physical and mental impairments that are unable to employ certain capacities, are still human persons of moral worth. Take for example an individual with *Down Syndrome*, or in a military context, a wounded soldier laying unconscious on the battlefield. These individuals have the capacity for rational thought, although under the circumstances there are limitations on them realizing it.

Lee and George argue that capacity, "ordinarily takes months, or even years, to actualize, and which various impediments might prevent from being brought to full actualization…Thus every human being has full moral worth or dignity, for every human being possesses such a rational nature."[11] It is important to be precise here on what is the final arbitrator for Lee and George. Ultimately for them, "The criterion for full moral worth is having a nature that entails the capacity (whether existing in root form or developed to the point at which it is immediately exercisable) for conceptual thought and free choice—not the development of that natural basic capacity to some degree or other."[12] In contrast, animal welfare activist Peter Singer uses Bentham's famous quote as his starting point, "The question is not, can they reason? Nor can

they talk? But, can they suffer?"[13] Singer here is making the shift away from a nature based upon rationality as the basis for moral worth, and instead arguing that the capacity to experience suffering or enjoyment is determinative.

One of the main criticisms of Singer's position is that it implies in some cases that animals will have greater moral worth than humans, who for example are no longer able to employ the capacity for rational thought. In regards to the concept of capacity, Anderson and Tollefsen argue that, "our given nature is largely one of capacities that require our action to be brought to actuality. Our life must be a life of deliberation, choice, commitment, and action if it is to be a good and flourishing life."[14] The Aristotelian and Thomistic notion of human "flourishing" as being a fulfillment of human nature (*ST I-II, q. 24, a. 3*) is clearly influential here. However, what precisely is meant by these concepts needs to be addressed in order to have a greater understanding of human nature.

B. Capacities and Human Flourishing

Capacity and human flourishing have come to mean different things to different philosophers. For example, philosopher John Finnis in his book *Natural Law and Natural Rights* describes seven basic human goods as fundamental to human flourishing. They are (1) life, (2) knowledge, (3) play, (4) aesthetic experience, (5) sociability of friendship, (6) practical reasonableness, and (7) religion.[15] In a similar vein, philosopher Martha Nussbaum uses the terminology of 'capabilities' (instead of capacities) to describe what are the essential attributes necessary for humans to pursue a good life. The 10 central human capabilities that she puts forth are (1) life, (2) bodily health, (3) bodily integrity, (4) senses, imagination, and thought, (5) emotions, (6) practical reason, (7) affiliation, (8) other species, (9) play, and (10) control over

one's environment.[16] Finnis and Nussbaum are in agreement on much of the basic goods/capabilities that are essential to promote human flourishing. Where the two reach different conclusions lies in how the basic goods/capabilities are practically applied by individuals and protected by the political community.

Nussbaum's capabilities are directed toward a political approach to a distributive justice theory based upon rights. She acknowledges Rawls' influence in her work but argues that his theory of justice is "too pessimistic" to be adequate. Additionally, on her view the state should only inform the individual of healthy choices (capabilities), and not be concerned with whether or not individuals actually pursue them (unless an action unfairly prohibits other individuals from pursuing their capabilities).[17] Finnis is also concerned about rights but more so in relation to how they impact the development of virtue in individuals and promote the common good.[18] Nussbaum and Finnis each place a different amount of emphasis on liberty and equality. Nussbaum argues for equality and liberty more in line with modern liberalism and the notion of individualism. Finnis, following Aquinas (*ST, II-II, q. 57, a. 1*) believes that rights should not be tied to freedom in the modern political sense but that "Justice always concerns what I owe to another—what that other has the right to, from, or as against me."[19]

The views of Nussbaum and Finnis shall be developed in chapter six with the discussion on the 'common good" and communitarianism. Although there are different strands to this theory, the most centrist approach is referred to as responsive communitarianism. This approach holds that individual autonomy has become the core value of modern society, including bioethics, to the detriment of the competing value of the common good.[20] Instead, what is needed is a greater balance of the two values. This topic is important because both Nussbaum and Finnis have strands of communitarianism in their theories, both agree that individual liberty is

important, and both are also clearly concerned with how human flourishing impacts the common good.

Related to this discussion are the views of Lagon and Arend who have balanced a number of different perspectives on dignity, including Judeo—Christian, Kantian, and those of Fukuyama and Nussbaum. They argue that *agency* is a fundamental element of human dignity. "Dignity lies not only in preventing denials of agency but in unleashing humans' agency to achieve their potential and thrive."[21] It is also important to recognize that individuals do not live in isolation but are part of the greater whole of society. Human dignity "requires social recognition of each person's inherent value and claim to equal access to opportunity. To be meaningful, human dignity must be institutionalized in practice and governance."[22] Thus it can be argued that there is a connectedness between all humanity especially as it relates to human flourishing and appreciation of human dignity. When the opportunities to flourish are removed or stunted, human dignity is not properly respected and the common good suffers.

C. The Basics of Human Dignity

In order to have a more complete understanding of human dignity, it is important to offer some differing historical conceptions. Sulmasy is helpful in this regard as he lays out a brief historical sketch on the topic of human dignity. Beginning with the Roman Stoics such as Cicero and Seneca, dignity came to be associated with honor and respect that a person is due based upon the degree to which they lived a virtuous life. In a different view, Hobbes took the meaning of dignity to be dependent upon how much that individual has of value to others.[23] Both of these positions spoke of dignity in terms of degree. That is, a person could have more or less dignity depending upon how they lived their life or how much value that others derived from them. The

morally virtuous person had a high degree of dignity while the dishonest person had a low degree of dignity. For Hobbes, virtue played no part in dignity. Rather dignity was based purely on the practical value that the individual had to the state and to others. The Kantian view of dignity breaks ranks with that of the Stoics and of Hobbes. Instead, as summarized by Sulmasy, Kant acknowledges a type of inherent dignity of the human person that does not vary in degree. This notion of dignity is based upon the belief that human beings should be treated as ends in themselves and never merely as a means to an end.[24]

The view of human dignity that this dissertation adheres to is one of an intrinsic nature as summarized by Pellegrino,

> "…human dignity is expressive of the inherent worth present in all humans simply by virtue of their being human. Intrinsic dignity cannot be gained or lost, expanded or diminished. It is independent of human opinions about a person's worth. It is the inherent grounding for the moral entitlements of every human to respect for one's person, one's rights, and one's equal treatment under the law in a just political order."[25]

Macklin has criticized the views of many modern bioethicists, such as Pellegrino's, for placing unwarranted emphasis on human dignity. She argues that dignity, "seems to have no meaning beyond what is implied by the principle of medical ethics, respect for persons: the need to obtain voluntary, informed consent; the requirement to protect confidentiality; and the need to avoid discrimination and abusive practices."[26] Although this dissertation takes a position opposed to that of Macklin, she does offer a valid objection. The term human dignity has been used in many different contexts and has come to mean different things to different people. Yet there are dangers to only associating human dignity with respect for persons or their autonomy. As the European Commission's document *Basic Ethical Principles in Bioethics and Biolaw* (1995-1998) points out, "Dignity should not be reduced to autonomy. It says more."[27] Kass

echoes this sentiment by noting that human dignity "….lies not in the patient's autonomy or any other personal qualities but rather in his very being and vitality."[28] One danger in particular is that if human dignity is viewed as merely respect for autonomy, and not grounded to human nature, then it runs the risk of being simply a norm of society. This norm could then be altered by subsequent societies, or even worse, completely rewritten and eliminated.

Take for example the atrocities of the Soviet regime, during which communism was the prevalent political ideology. Kazys (Casimir) Gecys was a Catholic priest who narrowly escaped being murdered by the Soviets in his native land of Lithuania after WWII for printing an underground Catholic newspaper. He wrote from his place of asylum in Chicago in 1955 noting that the Soviets denied the dignity and rights of the human person because,

> "To them man has value only because he is an instrument of the collectivity; and when he ceases to be a member, he ceases to have value….In such a society the dignity of man and his innate rights cannot conflict with those of the community because the community is a collective of men and the individual is rooted in the community even though he may transcend it….The collective is not interested in man's inner life, his real desires or in human relations, but only in the relations of the individual to the community."[29]

Marx and Engels held similar beliefs that the individual had no moral intrinsic worth. Rather the worth of the individual was based upon what value they had to the state. Their views were expressed in the *Manifesto of the Communist Party*, "Does it require deep intuition to comprehend that man's ideas, views, and conceptions—in word, man's consciousness—changes with every change in the conditions of his material existence, in his social relations and in his social life?"[30] Of course, the Soviets were not alone in their affront to human dignity and human rights. In terms of war, many nations contributed to the fact that the 20th century was the bloodiest century ever.

For example, Niall Ferguson in his book *The War of the World* cites a number of reasons why the 20th century was full of atrocities. One of those reasons was the embrace of racial ideology by international superpowers. He argues that humanity must overcome this evil in the future if there is to be true respect for human dignity and human rights. "We shall avoid another century of conflict only if we understand the forces that caused the last one—the dark forces that conjure up ethnic conflict and imperial rivalry out of economic crisis, and in doing so negate our common humanity. They are forces that stir within us still."[31] Implicit in these ethnic conflicts that were based upon racial ideology was a denial of the intrinsic dignity of the human person. This was a dangerous precedent to set. Ultimately those nations and individuals that held their race to be superior and committed genocide viewed other human beings as having less dignity, dignity that varied in degree, or no dignity at all.

Of course, this is not a guarantee that viewing dignity as something other than intrinsic will necessarily lead to such atrocities. Indeed, policies of nations or individuals that have a different concept of dignity other than intrinsic may in fact have laws in place that protect human rights. Still, the risk is there because they can be changed at any moment based upon the conventions of a society. On the other hand, nations and individuals can become complacent and accept the status quo without any moral reflection as well. Take for example the *Declaration of Independence* which states, "We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty, and the Pursuit of Happiness." In spite of this statement, the United States of America condoned the atrocity of legalized slavery for nearly a century before it was finally abolished through the actions of a bloody civil war. Nonetheless to have statements enshrined in law, such as the *Declaration of Independence*, that speak of equality and the intrinsic moral

worth of the individual, reinforces their immutability over conceptions of human dignity that are based upon degree alone.

D. Human Dignity as a Quality

Bostrom disputes the intrinsic nature of human dignity and instead argues for *Dignity as a Quality* which he defines as: "A kind of excellence; being worthy, noble, honorable. Persons vary in the degree to which they have this property….In humans, Dignity as a Quality may be thought of as a virtue or an ideal, which can be cultivated, fostered, respected, admired, promoted, etc."[32] Ruud ter Meulen, based upon a philosophy of values, and developing arguments put forth by Charles Taylor in the book *The Ethics of Authenticity*, has rejected Bostrom's claim for dignity as a quality.[33] Specifically, Ter Meulen attacks Bostrom's claims that transhumans endowed with technological devices may possess a higher level of dignity. He notes,

> "In fact, any being composed of such devices will be at risk of losing the capacity to participate in the commonality of values that is essential for recognizing dignity or for being recognized as having dignity. Such beings will certainly not have more dignity than human beings and may even be seen as having no dignity at all."[34]

Oderberg takes a slightly different line of reasoning than Ter Meulen and argues that a superhuman species is a metaphysical impossibility because,

> "No difference of degree could ever change the species. Knowing more, living longer, being stronger, none of these could ever turn a human into a non-human....All would be rational animals, humans in the true metaphysical sense regardless of how we classified them based upon narrow biology alone….A superhuman in the transhumanist sense either has more rationality or more animality."[35]

An Aristotelian influence is evident in Oderberg's reasoning and it should be noted that many scholars on both sides of the HE debate agree with his conclusions as well. Wilson for example, who is an advocate of transhumanism, believes that "no possible enhancement could render someone more than the equal of a standard human being."[36] Yet not all transhumanists are in agreement on this point. Buchanan argues that "We must consider the possibility that at some point in the future, different groups of human beings may follow divergent paths of development….If this occurs, there will be different groups of beings, each with its own "nature," related to one another only through a common ancestor (the human race)…."[37]

Another scholar who puts emphasis on value, similarly to Ter Meulen, is Gerald Allen Cohen who argues, "What if genetic manipulation could, for example, eliminate envy?...I would not want to eliminate all of our bad features. I conjecture that this is partly because the negative traits are part of the package that makes human beings the particular valuable creatures that we personally cherish, and are therefore worth preserving as part of that package…"[38] This argument has been put forth by other scholars as well. As Fukuyama notes, "Our good characteristics are intimately connected to our bad ones: If we weren't violent and aggressive, we wouldn't be able to defend ourselves; if we didn't have feelings of exclusivity, we wouldn't be loyal to those close to us; if we never felt jealousy, we would also never feel love."[39] Bostrom, in specifically addressing the HE debate, takes a different approach to the notion of value. He instead argues that although his view of Dignity as a Quality is one that requires variance in degree, it is beneficial because it has the potential to correct the bad characteristics that exist within human nature:

> "But let us pause and ask ourselves just how much Dignity as a Quality a person who spends four or five hours every day watching television has? Whose passions are limited to a subset

> of eating, drinking, shopping, gratifying their sexual needs, watching sports and sleeping? Who has never had an original idea, never willingly deviated from the path of least resistance, and never devoted himself seriously to any pursuit or occupation that was not handed to him on the platter of cultural expectations? Perhaps, with regard to Dignity as a Quality, there is more distance to rise than fall."[40]

Although Bostrom's observations of the problem may be accurate in some circumstances, his suggestion as to its solution is misguided. Bostrom is arguing for HE and noting that if science could alter these 'negative' aspects of individuals then it would likely result in more productive and useful members of society. Yet, who is to be the arbitrator of what is a 'negative' and what is a 'positive' characteristic? Bostrom has offered his suggestions as to what are 'negative' characteristics. However, based upon an argument from the perspective of autonomy, a person could determine that these 'negative' characteristics are actually 'positive' and in fact desirable in their own circumstances. Another difficulty with Bostrom's line of reasoning is that it once again does not respect the dignity of the person as something intrinsic but rather something that varies in degree or quality. Once this position has been accepted, a logical extension of it is that individuals who vary in degree may be afforded more or less rights or privileges depending upon their perceived value or quality.

As some of the preceding paragraphs have shown, behind all of these conflicting opinions there is a growing trend that is fueling the debate over HE. As HE emerged onto the scene over the last few decades there has been research that indicates the overlap between biology and politics is becoming ever more apparent.[41] The term used to describe this phenomenon is biopolitics. It is important to address this movement because in many ways the positions and arguments put forward by scholars on both sides of the HE debate will likely be similar to those put forth when proposing HE in the military.

E. Human Dignity and the Emergence of Biopolitics

Jotterand has rightly noted that, "Traditional moral theories and the concern with the intellectual "foundations" of moral reasoning within the context of health care, research, experimentation, and health care policy have taken an increasingly political dimension (bio-politics)."[42] There has come to be known two distinct biopolitical groups in the debate over HE and there moral permissibility, they are known as the bioconservatives and the transhumanists. Although the lines between the different groups are often blurred on certain issues, Moreno contends that each of them hold different understandings of what the proper role of science and biotechnology should be in relation to humanity.[43]

On the one hand bioconservatives, in general, tend to be suspect of HE because of the potential to violate moral norms and because HE may alter unforeseen aspects of human nature. They often call for government regulation that bans or restricts HE. Transhumanists on the other hand, who are sometimes grouped under the heading of bioliberals, are the strongest opponents of bioconservatives. They generally argue that HE are desirable and should be available to all at an affordable price because they could be used to overcome negative characteristics of the human person.[44] Transhumanists are often accused by bioconservatives of wanting to alter human nature to create a 'post human' future. For the sake of this dissertation, it is critical to highlight the main points of the arguments between the bioconservatives and the transhumanists because their positions, should they become realized in the future, have implications for how human dignity might be protected or abused. There is also a third biopolitical party, the bioprogressives, whose positions are not as polarized in the debate. They shall not be addressed in this section, although it is worth noting that they generally argue that HE are not intrinsically

wrong but because of the potential for abuse and the numerous safety concerns involved therein, HE should be restricted at this juncture until these concerns can be overcome.

The most outspoken proponents of the bioconservative movement have been Leon Kass, Francis Fukuyama, and Michael Sandel. Each has written extensively in the debate yet each takes a different conceptual approach to opposing HE. Kass is concerned with biotechnology, and particularly HE, because he believes that it has the potential to undermine our dignity and our essence by attempting to "master" nature and create the "perfect" being. He notes that, "At stake are the kind of human being and the sort of society we will be creating in the coming age."[45] McKenny believes that Kass has placed too much emphasis on nature as both the "source of human meaning" and also as a full expression of the "purpose of life."[46] An alternative position that he suggests is elevating the status of human reason so that it compliments nature and the two work in conjunction.

Fukuyama questions whether transhumans will be able to claim additional rights as a way of setting themselves apart from the rest of society that is not enhanced. He is concerned that what will result from HE is a battle over equality and basic human rights.[47] "If we start transforming ourselves into something superior, what rights will these enhanced creatures claim, and what rights will they possess when compared to those left behind?"[48] In Fukuyama's writing, he advocates for liberal democracy because he believes there is no political system that is more effective at preserving human rights. McKenny criticizes this position because, "in the last analysis it is not nature that is normative for Fukuyama but the moral vision of liberal democratic society."[49]

Outspoken transhumanists include Ray Kurzweil, Nick Bostrom, and John Harris. These authors oppose the bioconservative view and instead argue that HE should be used to take humans beyond their current capabilities. Kurzweil in particular argues that enhancements will enable humanity to correct physical and mental limitations, extend life spans, rid the world of disease, and allow for humans and non biological devices to merge and exponentially increase cognitive capabilities.[50] In response to such claims Fukuyama has famously noted that transhumanism is, "the world's most dangerous idea" because it would alter humanity in fundamental ways and be counterproductive to the promotion of human rights.[51] Bostrom argues that there is no evidence to suggest that Fukuyama's concerns are valid and summarizes his own position on transhumanism by noting that,

> "Transhumanists view human nature as a work-in-progress, a half baked beginning that we can learn to remold in desirable ways. Current humanity need not be the endpoint of evolution…by responsible use of science, technology and other rational means we shall eventually manage to become post-human beings with greater capacities than present human beings have."[52]

Against the views of Bostrom, Askland argues that, "[Transhumanists]…seek to sever us from an evolutionary past and undertake an entirely self-engineered future….it is useful to remind ourselves that we would be surrendering whatever protections (and liabilities) are provided by the plodding pace of evolution."[53] There are a variety of other arguments that are often put forth by both sides of the debate as well. There is of course the slippery slope argument. It can be summarized as, once a certain type of enhancement is permitted then that will open the door to further types of enhancements that will result in disastrous effects because society will never be able to satisfy their appetite for greater HE.[54] The problem with this argument is that because much of the HE debate is speculative in nature and filled with science

fiction it is difficult to produce arguments that HE will necessarily have negative impacts on society or on the military. Similarly, it downplays the effect that laws can have in restricting HE that are viewed as dangerous or unwanted.

Another argument put forward is that there is essentially no difference between cognitively enhancing humans via traditional classroom education and cognitively enhancing them via HE. As Buchanan notes, there is no moral difference between "enhancing human capacities and enhancing human capacities by the application of biotechnologies."[55] Bostrom concurs with this assessment, "Could it be that not only the person who has acquired a trait through personal growth and experience, but also one who has acquired it by choosing to make use of some enhancement technology, may possess the trait more authentically than the person who just happens to have the trait by default?"[56] This argument was anticipated quite early on in the development of bioethics in the United States. In 1982, speaking on the issue of genetic engineering, the *United States President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research* noted:

> "The possibility of changing human nature must however be kept in perspective. First, within the limits imposed by human beings' genetic endowment, there is already considerable scope by means other than gene splicing for changing some acquired characteristics that are distinctively human. For example, people's desires, values, and the way they live can be changed significantly through alterations in social and economic institutions and through mass education, indoctrination, and various forms of behavior control."[57]

i. Moral Intuition

Related to this statement by the President's Commission is the argument often put forth by bioconservatives that moral intuition should serve as a caution to society from pursuing

enhancements that seek to master human nature. Roache and Clarke contend that arguments put forth based upon moral intuitions can have value in some situations but that ultimately they are unreliable guides.[58] Singer is also doubtful that moral intuitions can provide us with any useful data to show how we ought to live.[59] Kass admits there is difficulty creating a well formulated argument from the perspective of moral intuition. He notes, "What is disquieting about our attempts to improve upon human nature, or even our own particular instance of it?...It is difficult to put this disquiet into words. We are in an area where initial repugnances are hard to translate into sound moral arguments."[60] Kass ultimately concedes that, "If there is a case to be made against these activities we sense that it may have something to do with….the attitude that is properly respectful of what is naturally and dignifiedly human."[61] McKenny agrees with this reasoning and notes that the strength of Kass' position is that he "resists the tendency in bioethics to identify dignity with personhood or with the capacity for autonomous choice but, most important, he denies that dignity is compatible with the elimination of natural necessity or the overcoming of natural limitations."[62]

Kass is not the only bioconservative who has discussed the subject of moral intuition. Roache and Clarke also accuse Sandel of resorting to moral intuition alone in trying to defend the intrinsic nature of the human person. Sandel has taken a bold position and responded to such arguments by noting,

> "To grapple with the ethics of enhancement, we need to confront questions largely lost from view in the modern world—questions about the moral status of nature, and about the proper stance of human beings toward the given world. Since these questions verge on theology, modern philosophers and political theorists tend to shrink from them. But our new powers of biotechnology make them unavoidable."[63]

In the context of the debate over moral intuitions, it is important to note that they may be valuable in the HE debate. However, to what extent they have value depends on a variety of factors. It would be presumptuous to say that all moral intuitions will always prove unreliable. More appropriately, it should be noted that arguments based upon moral intuition, especially in the HE debate, often require careful metaphysical reasoning in order for them to be persuasive. Philosophers who resort to the use of moral intuitions often do not have the luxury of utilizing empirical evidence to support their claims because they are dealing with theoretical abstractions such as human nature and human dignity.

ii. Theistic Arguments

Hollinger takes a more theological approach to the debate and is concerned that HE may alter four distinct dimensions of our human nature; the integrity of the human race, our finitude, our embodied soulness, and our male/femaleness.[64] He argues that if these dimensions are altered than the common good and ultimately society's relationship with God is at stake. These are legitimate concerns from Hollinger and echo many of the concerns of the bioconservatives as described in the preceding paragraphs, albeit in theistic form. Related to Hollinger's concerns is the argument that enhancing humans is the equivalent of "playing God." Allhoff, Lin, and Steinberg have noted that there are problems with this argument.[65]

First, it is extremely difficult to arrive at a consensus as to what exactly are the distinguishing parameters that "playing God" entails. Is receiving a vaccine for preventing pneumonia playing God? Is performing surgery to remove a spleen playing God? Similarly, whose God is being played? Christ? Muhammad? Yahweh? Buddha? This does not necessarily entail that theological arguments must be categorically dismissed however. A Pew Research

study released in 2012 entitled *The Global Religious Landscape*, noted that 84% of the world's population identified with a religious group.[66] Given that the overwhelming majority of the world affiliates with a religious group, it is honest to acknowledge that agreement on international principles, such as human dignity or human nature will need to account for these views of the majority or at least not be an affront to theistic principles in general. Andorno seems optimistic in this regard,

> "The circumstance that bioethical issues are closely linked to the deepest sociocultural and religious values of every society is not an obstacle to the formulation of universal norms but, quite to the contrary, can be regarded as a valuable asset in the effort to develop global bioethical principles. Precisely because bioethics is close to the most cherished aspirations of people, and people are essentially the same everywhere, the development of some minimally common standards in this area is feasible."[67]

Gordijn and Ten Have however have highlighted that arguments from a theistic position in bioethics are becoming more difficult to sustain due to secularization and the broad scope that international human rights is expected to cover.[68] Other scholars have argued that human dignity is not merely an element of Christianity or Western ideals but rather is something that all humans can intuitively grasp.[69]

Nussbaum on the other hand has criticized any metaphysical approach to grounding human dignity because it fails to show true respect for others in a pluralist democratic society. However, she does see value in having a "shared intuitive idea" as a foundational principle which permits different religions to interpret it in different ways.[70] This is an important point because it does not necessarily entail that theological arguments are not useful. If an argument is well reasoned and valuable than it should be used, regardless of its origins. Arend notes that faith-based institutions are an excellent starting point in affirming human dignity at an

international level even if the term is different or it is implemented in different ways in different cultural contexts.[71] Take the example of evolutionary biologist E.O. Wilson who has argued that wars are inevitable because they are embedded in our human nature.[72] This does not entail that humanity should become pessimistic and no longer work for peace. Similarly, all theological arguments against war are not invalid because they are not pluralistic in nature. World peace, human rights, and a greater respect for human dignity are possible if humanity, religions, and nations are dedicated to its cause.

iii. Giftedness

Related to this discussion, Sandel points out that there is often an overlap between theological and secular arguments against HE,

> "To believe that our talents and powers are wholly are own doing is to misunderstand our place in creation, to confuse our role with God's. But religion is not the only source of reasons to care about giftedness…If our genetic revolution erodes our appreciation for the gifted character of human powers and achievements, it will transform three key features of our moral landscape—humility, responsibility, and solidarity."[73]

Sandel believes "giftedness" is a human good that, if lost, would radically alter humanity's moral landscape if HE were to be undertaken. Here Kass agrees with Sandel,

> "A flourishing human life is not a life lived with an ageless body or untroubled soul, but rather a life lived in rhythmed time, mindful of time's limits, appreciative of each season and filled first of all with those intimate human relations that are ours only because we are born, age, replace ourselves, decline, die—and know it."[74]

Anticipating arguments such as these from bioconservatives, Saveluscu and Harris argue that nations should not restrict enhancements and that individuals may even have a moral

obligation to enhance both themselves and their future children.[75], [76] Hahn has taken issue with this line of thought from the position of an individual with a disability. He argues that making HE morally obligatory is demeaning to a whole range of individuals, particularly handicapped people who have found meaning in life through their struggles.[77]

Allhoff and colleagues have prudently argued that there is something at the heart of the HE debate that affects all individuals,

> "Humans are basically social creatures who like living in groups, and this aspect would appear to be under threat in a diversely enhanced world….radical enhancements raise the possibility of very diverse groups of humans (or creatures like humans) existing. Such considerations do suggest that there would be a need to rethink what constitutes a good life, or even an improved life, for humans."[78]

iv. Final Thoughts

Sparrow believes that ultimately the market place, not any church or religious entity, will be the force that drives individuals to use enhancements for themselves and particularly for their children. He argues that this will unfortunately be the case because without HE children will not be able to compete fairly with those who have enhancements.[79] Perhaps Caplan, with whom this dissertation disagreed with on the topic of human nature at the beginning of this chapter, offers the most sensible recommendation to summarize the debate, "What we must do is take each proposed enhancement technology under consideration and decide whether what it can do is worth whatever price it might exact."[80]

Currently no direct regulations or research moratoriums have been implemented on HE research in the United States. Roache and Clarke note that under the current political landscape the ideas pushed forth by transhumanists can be "reasonably expected to prevail" because

restrictions or bans on this type of research runs contrary to the individualism of Western liberal societies.[81] Current laws that have an impact on HE tend to be in relation to human subject research and will be addressed in section III of this chapter. It should be stated in conclusion to section I, that disagreement amongst scholars need not result in an impasse when it comes to the development of laws and policy related to the field of HE, particularly HE in the military. Military leaders and politicians will be required to take into consideration many factors in looking out for the best interests of individuals, soldiers, the nation's security, and the common good. Therefore balance, though difficult, is necessary and practical in this field to ensure that progress can be made in science and technology but not at the expense of the intrinsic human dignity of all people.

II. Human Rights Flow From Human Dignity

Thus far, this dissertation has attempted to show the importance of human dignity in the HE debate. However, it is important to emphasize that human rights proceed from and are grounded in human dignity. The intent of this section on human rights is to build upon the concept of human dignity as discussed in section I and lay the groundwork for HE research that will be discussed in section III. Human rights are important in the HE debate for a variety of reasons. Most notably, there is the obligation to have safeguards in place to protect soldiers or civilians in human subject research. Similarly, if HE became the norm in the future then there would be a need for laws and policies to protect those who have not undergone HE from those who have, or perhaps vice versa. Human rights are especially important in the context of the military as previously laid out in chapter two's discussion on the JWT. They offer many protections to both combatants and non-combatants, especially as they relate to what can or cannot be done to them if they become prisoners of war or are wounded. But in order to have a

solid foundation to make claims and enact laws such as these at the international level, there must be some basic principle driving human rights advocacy that nations can agree on. This chapter, and in particular this dissertation, in general have attempted to show that this principle is human dignity.

Section II of this chapter looks at a variety of claims for grounding human rights into law. This task involves some overlap with the biopolitics debate discussed in section I. The emergence of international human rights such as those contained in the Universal Declaration of Human Rights of 1948 (UDHR) and UNESCO's Universal Declaration on Bioethics and Human Rights of 2005 (UDBHR) give witness to how much the human rights movement has progressed. Yet it also shows how much work still needs to be done to ensure human rights protections for all. To speak of human rights in a theoretical context can be helpful in this regard, at least initially. But ultimately human rights must be applied in the real world if they are to become a useful tool in promoting human dignity. As noted in section I of this chapter, if human rights are grounded in mere conventions of society then they are prone to abuse. Yet human rights approaches founded upon metaphysical abstractions need practical application for them to be beneficial and they too are subject to disagreements on the international scene. If there is to be widespread agreement on human rights, it must begin with general and broad terms that the multitude of nations can find agreement on.

A. Human Rights

Sulmasy offers some valuable insight that can be used in this dissertation as it transitions from human dignity to human rights by noting,

> "Intrinsic dignity…..can be understood as the foundation for all human rights. We respect the rights of an individual because we first recognize his or her intrinsic dignity. We do not bestow dignity because we first bestow rights. Human beings have rights that must be respected because of the value they have by virtue of being the kinds of things that they are."[82]

This is a critical point here. If human rights have no foundation to them then there is no guarantee that they will be respected or that they will be enforced. By grounding human rights in human dignity, a more robust foundation is established. McCrudden has completed a lengthy historical analysis of human dignity and human rights and points out that philosopher Jacques Maritain played a crucial role in getting many diverse nations to come together in agreement and adopt the UDHR.[83] Maritain's strategy was "not to attempt to get an agreement on anything as divisive as a theoretical basis for human rights," but instead concentrate on what was necessary or what should absolutely be prohibited.[84] Andorno agrees with this strategic approach and notes that it has value because, "lawmakers are reluctant to provide rigid definitions, which may lead to unsolvable difficulties in the implementation of legal norms."[85] The passage of the UDHR was truly a remarkable feat given the plurality of religious and cultural differences that were represented by all the nations in the voting bloc. Moreover, it is evidence that agreement on international treaties can be reached. It also shows that when nations are committed to a cause, there can be a positive outcome for all involved. This shall be the topic of chapter six of this dissertation when recommendations are put forth for an international treaty on the use of HE in the military.

B. The Impact of HE on Human Rights

There are a number of different treaties and laws that help protect individuals from human rights abuses. To begin with it is helpful to take a closer look at the treaty that is most

well known in this regard, the UDHR. The Preamble to the UDHR begins in part, "Whereas the peoples of the United Nations have in the Charter reaffirmed their faith in fundamental human rights, in the dignity and worth of the human person and in the equal rights of men and women…." Then again in Article I, "All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood."[86]

In the context of HE, it has been argued that perhaps the UDHR will not apply to 'post humans' because they fall outside the parameters of who the treaty was meant to protect. In an article entitled *Taking the "Human" Out of Human Rights*, transhumanist John Harris argues that there will very likely be a different post human species in the future because of HE. Thus, human rights as conceived in society today will no longer be adequate for the future. "Indeed it is very probable that in the future there will be no more humans as we know them now…."[87] Gunderson draws from this line of reason and cautions against utilizing human rights as the basis for any international treaties on HE. International treaties are important, he argues, but establishing them in human rights language would be too restrictive and not allow for advances in the development of a variety of beneficial HE technologies.[88] However in Visciano's interpretation, "….human rights are not lost in any transition to the post human. Their reasons, to the defense of life and dignity, receive a further and even stronger confirmation."[89] Chapman has also appropriately noted that "The human rights paradigm precludes adding to (or for that matter, subtracting from) human dignity."[90]

Annas, Andrews, and Isasi have long advocated for a UN convention and treaty on cloning and genetic engineering in order to "preserve the human species" from potential dangers of these technologies that could alter the foundations of cherished human rights.[91] One of the

difficulties with advancing such a treaty lies in the terminology that would be used. As the UDHR example above highlighted, it is prudent to seek those things upon which nations can agree rather than seek language that is controversial in a religious and cultural context. Related to this topic of advocating for international treaties to advance human rights, Lagon has proposed creating a Global Trust for Governance. Similar to the UN, "Its purpose would be to build developing nations' capacity to implement rule of law and unleash the potential of marginalized groups worldwide, promoting not only human dignity but, global economic growth."[92] Arend has noted such an international governing body would also likely advance human rights in war torn countries that are subject to terrorist attacks. He believes economic issues are often a root cause of terrorism and such a governing body may be able to persuade those who are prone to supporting terrorism to support the cause of human rights instead.[93]

C. Trending Toward Greater Respect for Human Rights

According to some scholars there seems to be a growing global trend toward a greater respect for human rights. For example Donnelly notes that, "dominant understandings of sovereignty have become less absolutist and more human rights-friendly, a trend that…is likely to continue to develop, modestly, in the coming years."[94] Buchanan seems to echo this sentiment by noting that the UDHR began as a nonbinding and largely aspirational goal. Since that time the UN Security Council has authorized military interventions to stop human rights abuses in both Bosnia and Somalia and has created an International Criminal Court to prosecute those accused of human rights abuses. "Taken together, these developments signal a transition from an international legal system whose constitutive, legitimizing aim was peace among states…to one that takes the protection of human rights as one of its central goals."[95] This is a positive sign for

the development of HE as well because it suggests that nations may be willing to come together on some international principles that could govern the research and use of HE for military use.

On the other hand, Posner disagrees that the advancement of human rights has had a positive impact throughout the world. He argues that human rights laws are arbitrary and have proven to be fruitless since the passage of the UDHR. For example, nations such as the United States, Russia, China, and Brazil (among many others) have committed numerous human rights violations all while being a signatory nation to the UDHR. He argues that what is needed instead is a type of "developmental economics" that promotes foreign aid to culturally diverse and developing nations to raise their standards of living without imposing a Western ideology of human rights.[96] Posner claims human rights treaties do not require Western nations to change their behavior but in contrast require non-Western nations to drastically change theirs. Although Posner's argument is more complex than what has been stated here, it can be argued it runs the risk of unfairly dismissing a principle as invalid based upon its origins alone. Andorno offers a powerful response to this line of reasoning noting that,

> "The relevant question is whether or not this idea deserves to be promoted, no matter where it is conceptually developed for the first time. Merely pointing to moral diversity and presumed integrity for individual cultures does not, by itself, provide a philosophical justification for cultural relativism nor a sufficient critique of universalism."[97]

Indeed, it is unfair to dismiss an idea that has originated in the West as necessarily being irrelevant to other cultures. Human dignity and human rights have been championed by Western nations and many non-Western nations as well, as the passage of the UDHR proves. If taken to the extreme, this form of pluralism and cultural diversity can be counterproductive and result in little to no progress being made in research and human rights abuses running rampant. The topic

of cultural diversity, although absent from the UDHR, was however addressed by the UDBHR in 2005. The UDBHR is relevant to the topic of HE in the military because it specifically deals with issues of bioethics. Faunce notes that although the declaration is nonbinding under international law, it does promote important bioethical principles at an international level.[98] The declaration states in Article 3, "Human dignity, human rights, and fundamental freedoms are to be fully respected."[99] The UDBHR then addresses important principles such as beneficence, autonomy, consent, privacy, and respect for cultural diversity and pluralism. Article 12 notes that claims to cultural diversity and pluralism, "are not to be invoked to infringe upon human dignity, human rights and fundamental freedoms." Gordijn and Ten Have have argued that this is the only article in the UDBHR which has constraints placed upon it within the text itself and thus by extension it can be argued that it is the weakest principle in the declaration.[100]

Another important aspect of the UDBHR is that it promotes the right to health. Pellegrino is concerned with human rights from the position of health and medicine and notes, "In law the corrosion of human dignity weakens human rights; but in medicine, its corrosion weakens human beings' humanity itself—i.e. the foundations for both the rights and the obligations inherent in humans as humans."[101] Article 14 of the UDBHR goes on to promote access to health care and essential medicines. O'Brolchain and Gordijn point out that the UDBHR provides a foundation for talking about HE on the international scene.[102] Moreover, and perhaps most interestingly, the question of HE is alluded to in the UDBHR in Article 16, "The impact of life sciences on future generations, including on their genetic constitution should be given due regard." This is often one of the most powerful criticisms labeled against certain HE technologies in that the potential impact of HE on future generations is dismissed. This topic shall be addressed again in chapter five. In summary, Andorno points out that the linkage

between bioethics and human rights is inseparable in part because health is such a crucial aspect in human rights.[103]

D. Nussbaum and Finnis on Human Rights

Interestingly, health is also one of the basic capacities/capabilities cited by both Nussbaum and Finnis. For both of them it is necessary in order to ensure human flourishing. Nussbaum believes her capabilities approach is more pluralistic in nature and better suited to advance human flourishing than a purely human rights approach. She believes that the human rights approach is often too preoccupied with advocating for greater access to private property or economic advantages to individuals such as the right to shelter.[104] She argues that focusing on material means of well-being such as these downplays the freedom and capability of individuals to achieve well being of their own accord. What results from this type of action is that an individuals' opportunity to flourish in society is stunted. Finnis believes that the UDHR is a useful outline of the common good because it relates to the capacities and basic human goods that he advocates.[105] Similarly, Finnis notes that he admittedly gives priority to the common good and justice over individual rights, but not rights in the sense that they are portrayed as in the UDHR.[106]

As noted earlier, the views of Nussbaum and Finnis shall be addressed again in chapter six. It is worth noting here however that Andorno echoes a sentiment mentioned by Finnis earlier in this chapter, namely that human dignity and by extension human rights are a requirement of justice toward every individual. Andorno believes that, "The international community and individual states are obliged to recognize that people do have basic rights (i.e. that they have equally valid claims to basic goods) because these latter derive from the dignity which is

inherent in every human being."[107] Andorno draws his inspiration from John Rawls' famous work *A Theory of Justice* wherein Rawls claims, "each person possesses an inviolability founded on justice that even the welfare of society as a whole cannot override."[108]

III. Human Research Experimentation and HE

Chapter three now shifts from a macro view of human dignity and human rights and looks more specifically at their importance for human subject research in relation to HE in the military. First, a brief historical sketch lays out some of the past human rights abuses in the field of human subject research. These examples include indefensible research conducted on soldiers both with and without their prior knowledge and informed consent. This underlines the need to treat soldiers as a vulnerable population when conducting human subject research, which shall also be discussed in this section. Next, relevant laws and policies are addressed. Ethical principles that are part of both civilian medical ethics and military medical ethics, including those mentioned in chapter two such as paternalism, are then discussed. Given the unique nature of the military in relation to the national defense of the country, exceptions to the relevant laws and policies are highlighted along with potential areas of abuse. These potential areas of abuse will be addressed more extensively in chapter five.

Recall the definition of HE that this dissertation adheres to is, any medical or biological intervention introduced into the body designed "to improve performance, appearance, or capability besides what is necessary to achieve, sustain, or restore health."[109] By extension, this definition also sets out the rough parameters of what is and is not considered HE human research. However, there is often no distinguishable difference between research focused on HE and research that is health related, such as clinical drug trials. Furthermore, the overlap between

the two increases the likelihood of dual use possibilities where, for example, the data collected in clinical trials may be used for both therapeutic and enhancement purposes.

Moreno has pointed out that the US military, mainly through Defense Advanced Research Projects Agency (DARPA), is investing in extensive research on the use of HE to bolster soldiers' performance and prepare them for the future of warfare. Additionally, the former director of DARPA told a congressional committee in 2003 that their goal was to exploit "the life sciences to make the individual warfighter stronger, more alert, more endurant, and better able to heal."[110] It goes without saying that an underlying goal of the military is to make soldiers smarter and stronger in preparation for combat. Mehlman and colleagues note that much of the HE research is actually being carried out by civilian test subjects, but there is still significant portions being carried out by members of the military as well.[111] Although the role of DARPA in the strategic vision of how HE in the military can be employed shall be discussed at greater length in chapter four, some mention of them here in chapter three is relevant as well because they play an important role in HE research.

A. Historical Background

One of earliest documented examples of soldiers being used in research occurred in 1900 when Army Major Walter Reed conducted trials on soldiers to determine how yellow fever was transmitted. Interestingly, all of Reed's volunteers gave written consent to the study and were informed of the risks. Although the risk of death from yellow fever existed, Reed's safety protocol included constant observation by highly respected military physicians that were conducting the study. Amoroso and Wenger note that Reed's study pioneered the requirement of obtaining informed consent from soldiers. However, the study could not be conducted in today's

research climate because current guidelines forbid research to be conducted where death is a likely outcome.[112] For years, Reed's safety protocols would serve as examples of how research should be ethically conducted on military subjects. However, with the formal declaration of war by the United States and subsequent involvement in WWII and the Cold War, the nature of the research shifted away from a peacetime ethic with informed consent as one of its central tenets, to one focused primarily on war and national security.[113]

i. Mustard Gas

During the 1940's the US Navy conducted mustard gas experiments on approximately 2,000 soldiers without first obtaining informed consent. The studies were classified and many of the records were destroyed which led to veterans battling the long term health effects of mustard gas on their own. Some 50 years later in 1991, Congress approved compensation for these veterans when the US government finally admitted that it did not disclose safety risks or obtain informed consent from research participants in the studies.[114] Additionally in 1995 the publication of the Final Report of the *Advisory Committee on Human Radiation Experiments (*ACHRE*)* brought to light many of the trials conducted by the United States toward the end of WWII and during the Cold War and the unethical research protocols that were involved therein.[115] Yet the testing of 2,000 US Navy soldiers in the 1940's was only the tip of the iceberg. The ACHRE brought to light that the number of individuals that were subjected to mustard gas testing was actually closer to 60,000.[116]

Some of the mustard gas trials were race-based in that researchers hoped to determine if skin complexion played any part in prevention of injury from mustard gas. Soldiers were locked in gas chambers and exposed to mustard gas in such high quantities that many experienced

blisters over several parts of their bodies including their face, hands, buttocks, and genitals. Some soldiers even suffered blindness and damage to their lungs as a result of the exposure. A Naval Research Laboratory Report gives telling evidence of how soldiers were often lured into being test subjects under false pretenses or were given a "firm" talk by their superiors to submit to the testing. The report reads in part, soldiers who "did not cooperate fully" were given an "explanatory talk and if necessary a slight verbal dressing down…always proved successful."[117] The ACHRE ultimately emphasized that the United States was beginning to admit fault for the research practices that it used in the past.

Bolton notes that although the United States admitted to wrongdoing and unethical conduct, as laid out in the ACHRE, the United Kingdom (UK) has been less forthcoming. The UK has been reluctant to engage the subject of their country's involvement in unethical research practices related to human subjects, and military personnel in particular, for a variety of reasons, including embarrassment.[118] One such case example that the UK has been reluctant to discuss is the exposure of over 20,000 soldiers to chemical warfare experiments at the Chemical Defence Experimental Establishment at Porton Down from the 1940's to the 1980's. During this timeframe soldiers were exposed to nerve gas, mustard gas, tear gas, and lysergic acid diethylamide (LSD).

On May 6, 1953, test subject #745 at Porton Down sat down at a table in the research laboratory. #745 was scheduled to be exposed to a 'reduced dosage' of 200 milligrams of the nerve gas Sarin. Sarin was applied to his left arm which was covered by two layers of clothing. Less than an hour after exposure to the Sarin, test subject #745 was dead. The soldier's rank and name were Leading Aircraftsman Ronald Maddison.[119] Maddison's family only received vindication in 2004 when a UK court found that his death was unlawful. As Schmidt notes,

Maddison's death resulted from "an inadequate level of disclosure and an understatement of the risks, despite the fact that there was widespread consensus in the United Kingdom that the principles of the Nuremberg Code should govern these types of experiments."[120]

Porton Down responded to the verdict by noting that their actions "were consistent with the standards of the day."[121] Perhaps even more telling is that there is evidence that shows Porton Down tried to cover up Maddison's death and continued to conduct research on military subjects using Sarin until at least 1983. All of this was done without ever informing test subjects of Maddison's death or of all of the potential side effects.[122] Many of the soldiers also felt that by volunteering to be a test subject at Porton Down they would receive a promotion and better treatment from their superiors.[123] Amongst other ethical issues, this case once again highlights the necessity of treating military personnel as a vulnerable population in human subject research and experimentation.

ii. Radiation

Beginning with the nuclear weapons testing on the island of Bikini Atoll in 1946, until 1963 when the Limited Test Ban Treaty was signed, the United States conducted numerous radiation studies on both civilians and soldiers. A number of these exercises were conducted under the code name "Desert Rock." In 1951, the Army conducted Desert Rock I where 600 soldiers were placed at varying distances up to seven miles from the blast site. Numerous individuals were exposed to high levels of radiation but never gave informed consent for the testing. Many soldiers reported that even though their eyes were shut they "could see the bones in their forearms at the moment of explosion."[124] The commander overseeing the testing argued

that he did not "view this as research but as part of routine training" so informed consent was never obtained.[125]

Desert Rock exercises were conducted under the same pretenses until at least 1957. This was done despite the Nuremberg Code being written in 1947 and adopted by the US military as the Wilson Memorandum in 1953. The Wilson Memorandum called for a variety of changes to human research trials including obtaining informed voluntary consent from soldiers and civilians prior to human research testing. Some authors, commenting on ethical issues related to the Desert Rock exercises, note that the Wilson Memorandum was either completely ignored by researchers or "was not made known to researchers conducting these experiments."[126] Similar to the Desert Rock exercises, Air Force Pilots were asked to fly through radiation clouds just minutes after the detonation of small scale nuclear bombs in the 1950's. Despite adverse reactions to the pilots during the initial tests of flying through radiation clouds, the researchers decided to knowingly expose the pilots to even higher doses of radiation. Perhaps the most telling evidence of complete disregard for the welfare of the pilots came from the Commissioner of the U.S. Atomic Energy Commission who noted in private to all the researchers who were conducting the tests that, "we must not let anything interfere with this series of tests—nothing."[127]

iii. Psychotropic Drug Experiments

In 1958, James B. Stanley, a US Army Master Sergeant, volunteered to be a human research test subject. The research program was meant to test different pieces of protective military clothing to determine how effective they were at defending against chemical warfare agents. He reported for duty at the US Army's Chemical Warfare Laboratories at Aberdeen

Proving Grounds in Maryland where the tests were to take place. Unbeknownst to Stanley, instead of actually testing protective clothing he was secretly given four doses of LSD per month for nearly a year to study the short term and long term effects of the drug on humans. For the next year he was plagued with random hallucinations, memory loss, and uncontrollable bursts of rage.[128] Stanley's tort claim against the government reads in part that he would "awake from sleep at night and, without reason, violently beat his wife and children, later being unable to recall the entire incident."[129]

In this case Stanley never gave informed consent and was volunteering under the false pretense that he was testing military clothing. Nonetheless, Stanley lost his tort claim because the United States is not liable to soldiers for "recovery of damages for injuries that arise out of or are in the course of activity to service."[130] Perhaps even more disturbing than the outcome of the civil case was that the military argued that national security interests permit "a more tolerant interpretation of moral-ethical values, but not legal limits."[131] The court ruling cited the legal precedent of the 1950 case *Feres v. United States*, often referred to as the Feres Doctrine, which holds that members of the military are generally not liable under the Federal Tort Claims Act (FTCA) for injuries sustained as a result of negligence of other members of the military.[132] Siegel has been critical of this decision and of subsequent similar court decisions ruling against service members. She notes that, "By closing off the ability to redress a tort injury or to obtain a remedy for a constitutional violation against the government, government researchers can more easily engage in harmful research on military personnel without fear of punishment."[133]

B. Ethical Guidelines Governing Human Subject Research

The preceding paragraphs laid out historical examples of human subject research abuse in the military and highlighted some of the ethical issues involved therein including informed consent and protections for vulnerable populations, amongst others. It is next important to discuss some of the ethical guidelines that are relevant to this field. Many of the ethical guidelines to be discussed in the following paragraphs came about as a result of reactions to war crimes of WWII or unethical research practices during the Cold War.

i. Nuremberg Code, Geneva Conventions, and the Declaration of Helsinki

After WWII the Allies were determined to bring a number of doctors to justice for their involvement in medical atrocities committed throughout the duration of the war. The judgment handed down during the Nuremberg Trials also contained a code of medical ethics that consisted of 10 points.[134] These points laid out the importance of recognizing the human rights of patients-subjects and also the obligations that physicians and researchers have to their human subjects while conducting experiments.[135] The Nuremberg Code (1947), as it came to be known, was directed at responsible research in the area of medical science for the benefit of humanity. It also however, underscored the human dignity of the individual and championed human rights. Conversely, it was often argued that much of the unethical human subject research carried out both during and after WWII was done under the justification of national security. Schmidt however rejects fault-proof claims of national security by noting that, "A persons' right to self-determination and inviolability cannot be calculated against the need for medical progress or any other claim that society and science may or may not have to trump the individual rights of its citizens."[136]

The Nuremberg Code was also influential in shaping the UDHR and the Geneva Conventions but unfortunately it did not initially have a significant impact upon human subject research practices because it appeared to be ignored by researches who were conducting human experimentation. Katz notes that the Nuremberg Code was initially viewed as, "a good code for barbarians but an unnecessary code for ordinary physician-scientists."[137] Bolton has suggested that perhaps the Code was not accurately portrayed to researchers and doctors at the time and that it failed to address many relevant issues in human subject research. He notes, "In particular, the Code failed to differentiate between therapeutic and non-therapeutic experiments and made no reference to doctor-patient relationships. These were issues that had to be grappled with in postwar discussions of guidance on human experiments."[138]

The Geneva Conventions (1949) also dealt with the subject of medical experimentation. Geneva Conventions III (Article 13) specifically states that, "no prisoner of war may be subjected to physical mutilation, or to medical and scientific experiments of any kind which are not justified by the medical, dental or hospital treatment of the prisoner concerned and carried out in his interest." The Geneva Conventions Additional Protocol I of 1977 similarly states that it is forbidden to carry out any medical or scientific experiments without a person's consent. It should be noted however that the United States has not adopted Additional Protocol I for reasons unrelated to medical experimentation. In 1953, six years after the Nuremberg Code was released, the Wilson Memorandum, as discussed earlier in this section, was issued under a 'Top Secret' classification by the Secretary of Defense Charles Wilson. In reality, the memorandum stated little more than the actual substance of the Nuremberg Code. The basis for the 'Top Secret' classification is disputed. However, there is evidence to suggest that the Department of Defense

(DoD), "had a general desire to keep hidden from public view any indication that it was involved in biological and chemical warfare-related research…"[139]

After the Nuremberg Code and Geneva Conventions, the next major statement released on the international scene, that was related to human subject research, was the 1964 Declaration of Helsinki, which some authors view as an example of the weakening of human research standards. They argue the Declaration was a "document drafted by doctors, for doctors, and with doctors' interests in mind."[140] Others have argued that the fact that it was drafted by physicians is actually the strength of the Declaration in that there was a need at the time to balance the safety of the patient with the doctor's fundamental obligation to 'do no harm.' The Declaration was, "the first truly international regulation to address this problem using a pragmatic approach that simultaneously offered real protection.[141] The Declaration has since undergone numerous revisions, with the eighth version having been adopted in October 2013.

Of these three documents, technically only the Geneva Conventions is legally binding under international law for the United States. However, the impact of these documents cannot be underestimated. For example, the underlying principles contained in these documents serve as the basis for the Code of Federal Regulation (CFR) Title 45 Part 46. This deals specifically with regulations issued by the Health and Human Services Department that are related to the use of federal funds for research conducted on human subjects within the United States.

ii. The Belmont Report

The *National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research* (Commission) set out to address four common themes over the course of their work from 1974 until 1979. These issues were (1) the boundaries between practice and

research, (2) the assessment of risk benefit criteria in determining the appropriateness of human research subjects, (3) the appropriate guidelines for the selection of human research subjects, and (4) the nature and definition of informed consent in different research settings.[142] At the conclusion of their meetings the Commission released the Belmont Report (Report) which was intended to give all relevant parties involved in human subjects research a problem solving framework to utilize when ethical issues presented themselves. Parasidis notes that the Belmont Report was a reaction to a number of unethical research studies that were just being exposed at the time. These included the Tuskegee Syphilis Study and the atrocious experiments conducted at Willowbrook State Hospital and the Brooklyn Jewish Chronic Disease Hospital.[143]

The three basic ethical principles stated in the Report were (1) respect for persons, (2) beneficence, and (3) justice. First, respect for persons requires treating individuals as autonomous agents and acknowledging that persons with diminished autonomy are entitled to protections. Next, beneficence can be summarized as doing no harm and maximizing potential benefits while minimizing potential harms. Finally, justice requires society to ask the question, "Who ought to receive the benefits of research and bear its burdens?"[144] The Report later went on to speak of the conduct of researchers and to highlight the importance of informed consent as well. The Report has had a lasting impact on the field of bioethics since its release. Perhaps the most apparent example of its impact is reflected in the work of Tom Beauchamp and James Childress who released the first edition of their book entitled *Principles of Biomedical Ethics* in 1979.[145] The book is currently in its seventh edition and has consistently promoted four core principles as central to biomedical ethics. Those principles are (1) respect for autonomy, (2) nonmaleficence, (3) beneficence, and (4) justice. Although Beauchamp and Childress developed

the four principles in a civilian setting, the principles can be seen as often overlapping within the context of the military as well.

C. Paternalism in the Military

Chapter two on military culture pointed out that ideally military medical ethics is characterized by principles such as respect, autonomy, and beneficence. However, there are exceptions to this ideal given the paternalistic nature of the military. For example, in wartime the principles may or may not be adhered to depending upon the magnitude and necessities of the war. Moreover the paternalistic nature of the military becomes increasingly more apparent during wartime because the necessity of obeying lawful orders is often amplified by claims to national security. The principle of paternalism was deliberately left out of the discussion in chapter two on military medical ethics and instead shall now be addressed here within the context of the US military's use of investigational drugs on soldiers without their informed consent.

The principle of paternalism can be defined as "the interference of a state or an individual with another person, against their will, and justified by a claim that the person interfered with will be better off or protected from harm."[146] In civilian medicine, this concept was quite popular until the last part of the 20th century. Wolfendale and Clarke note that, "It was widely believed that patients lacked both the specialized knowledge and relevant medical experience that medical decision making requires, and so were in no position to make significant medical decisions."[147] This paternalistic view was increasingly falling out of favor because of documents such as the Belmont Report that called for greater respect for persons, especially in relation to informed consent. Another influential publication at the time that highlighted the negative effects of

paternalism was Jay Katz's, *The Silent World of Doctor and Patient*. Katz argued for greater respect for the autonomy of patients and challenged doctors to inform their patients of choices instead of acting in a paternalistic manner.[148] Although this approach to civilian medicine was laudable, it was not entirely applicable to a paternalistic organization such as the military.

Military leaders, typically officers and non-commissioned officers, have a duty of care to their subordinates. Under this concept of duty to care, military leaders conduct a variety of paternalistic actions including making sure that soldiers are properly trained, have the proper equipment and clothing, are receiving their entitlements and pay, and are physically fit to fight in war if they are ordered to do so. To be sure, these are relatively minor instances of paternalism and it can be argued that soldiers have given implicit consent to these and many of the other common aspects of military life. Some scholars have noted that, "Recruits certainly understand that they are forfeiting some autonomy when they enlist, and that they may be ordered into dangerous and even life threatening situations."[149] On the other hand, when soldiers enlist or are commissioned into the military, it is much more debatable whether or not they give implicit consent to experimental or investigational drugs.

i. The Persian Gulf War

Prior to Operation Desert Storm and the Persian Gulf War in 1990, it was argued that vaccines and pharmaceuticals were needed to protect soldiers from the threat of being exposed to a biological or chemical agent. Specifically, the DoD argued that the anti-nerve agent pill that contained pyridostigmine bromide (PB) and the Botulinum toxoid (BT) vaccine should be mandatory for soldiers for their own safety. Before the combat phase of the Persian Gulf War, the DoD petitioned the Food and Drug Administration (FDA) to grant a waiver to the informed

consent requirements (known as Rule 23d) for the use of investigational drugs and vaccines on US soldiers that would soon be deployed.[150] The DoD noted that there was evidence that Iraq had used biological weapons in the past and there was concern that these biological agents would pose a significant threat to the life of US troops as well.[151] Iraq's actions in the past were in direct violation of the Biological Weapons Convention of 1972 wherein the signatory nations of the Convention, "….for the sake of all mankind, do exclude completely the possibility of bacteriological (biological) agents and toxins being used as weapons, convinced that such use would be repugnant to the conscience of mankind and that no effort should be spared to minimize this risk."[152] A similarly important treaty was created at the Chemical Weapons Convention of 1993.[153] The Unites States has adopted both of these treaties. Thus the fact that other nations such as Iraq had biological weapons and had used them was concerning to the United States and to many other nations at the time. Thus in many ways it can be argued that Iraq's prior use of biological weapons served as the catalyst for the waiver of the informed consent rule that the DoD sought.

At the time the DoD was seeking the waiver, the FDA only permitted investigational drugs, off-label drugs, and medical supplies to be used for research purposes when no drug or therapy was available in life-threatening situations. The FDA, drawing from the Belmont Report, similarly required informed consent from the patient before an investigational drug could be used for therapeutic purposes. The DoD's argument in seeking the informed consent waiver was that "obtaining informed consent in the heat of imminent or ongoing combat would not be practicable."[154] In the end the FDA granted the DoD's request for the waiver. Interestingly however, the reason why the FDA granted the request is controversial. The DoD claimed that it trusted that the FDA had deemed the investigational drug to be safe and thus permitted to be

used without informed consent. Conversely, the FDA claimed that the waiver was granted because it believed that the DoD had determined that military necessity required the waiver of informed consent, not that the drug had already been deemed to be safe.[155]

Regardless of the justifications, the DoD began mandatory vaccinations of all soldiers with (PB) and the (BT) vaccine without their informed consent. This was done despite the fact that these drugs were still being evaluated by the FDA for their safety and effectiveness as a pretreatment against chemical warfare.[156] Javitt has noted that the health issues that resulted from the administering of the PB pill and BT vaccine continue to be far reaching to this day. Soldiers have developed cognitive problems, chronic headaches, skin rashes, respiratory problems, and reproductive problems. These problems have come to be known collectively as 'Gulf War Illness.'[157]

Annas argues strongly against the actions of the DoD noting that they, "confused military necessity with medical ethics" in this case.[158] Howe notes that the DoD's action were likely not egregious at the time because, "the most knowledgeable military and civilian authorities believed that the risk/benefit ratio of these agents was overwhelmingly favorable to soldiers."[159] Wolfendale and Clarke, contra Annas, argue that the actions of the DoD were justified because they were aimed at protecting the soldiers and the nation. They note, "Providing investigational or nonstandard vaccines to combatants is intended to protect the health and combat fitness of the individual combatant and to enable them to fulfill military objectives."[160] Siding with Annas however, Milner has argued that the DoD's action was a blatant violation of the Nuremberg code and "effectively turned US military personnel into guinea pigs."[161] It should be noted however that the DoD did not seek the informed consent waiver for the purpose of conducting human subject research in this case. Instead, it was argued that this was necessary for the protection of

all soldiers and as a matter of national security because without the vaccinations the military might not be able to achieve their strategic objectives.

Wolfendale and Clarke argue that there was no violation of soldiers' autonomy in the case of mandatory vaccination without informed consent because, "When military personnel are given a course of medical treatment, it is with the explicit aim of preparing them to be effective in combat, rather than with the aim of enabling their autonomous choice about medical treatment to be realized."[162] Gross has sided in favor of the DoD as well in this case noting that, "Risk alone, even the high risk of an investigational drug, is insufficient to require informed consent from soldiers if medical risk is no higher than military risk, distributed fairly among all troops, and necessary to accomplish military objectives."[163] In the end the debate still remains contentious, especially given the fact that many veterans still suffer from the 'Gulf War Illness' to this day. Melson however provides a prudent piece of advice,

> "In sum, peacetime must be used to formulate, solidify, and implement protections for service members concerning biotechnology testing and its use in the military. History has shown that addressing such issues in wartime inevitably leads to practices based on a sacrifice of the few for the good of the many mentality."[164]

ii. Anthrax Vaccine Immunization Program (AVIP)

The controversy over the DoD's mandatory drug vaccinations for soldiers did not end after the Persian Gulf War. In 1998 the DoD began to implement the Anthrax Vaccine Immunization Program (AVIP), which requires that all members of the military, who are deemed by the DoD to be at risk for anthrax exposure, receive mandatory vaccinations. Prior to the implementation to the AVIP program the anthrax vaccine had only earned FDA approval to protect against cutaneous anthrax, but the DoD desired to use the vaccine as a pretreatment for

anthrax that may be inhaled as well.[165] The AVIP program continued to remain controversial and in 2001 public interest in the anthrax vaccine soared after 9/11 and the subsequent anthrax attacks that occurred in New York, New Jersey, Florida, and Washington, D.C. In fact, demand was so high for the vaccine that the *Washington Post* reported that the vaccine's maker *BioPort*, left a recorded message for callers inquiring about the vaccine saying, "All the stockpile that currently exists is owned by the Department of Defense. At this time there is no opportunity for commercial sales."[166]

In 2003, six service members filed a lawsuit against the United States, arguing that in implementing AVIP, the DoD did not obtain the waiver of the informed consent requirements before vaccinating soldiers. In response to this lawsuit Congress came to the aid of the DoD and passed the BioShield Act of 2004 which gave the FDA the power to permit the use of investigational drugs during a public health emergency. Thus, the DoD was once again able to circumvent the informed consent requirement. After extensive testing the FDA ultimately approved the anthrax vaccine for all routes of exposure. In the midst of all the controversy the DoD decided to make the AVIP voluntary later in 2004 despite the high volume of US soldiers that were deploying to Iraq and Afghanistan.[167]

Soon after AVIP became voluntary, a study was conducted to determine military members' perceptions of AVIP. The results noted that only 19% of respondents felt that the military was effective in educating and training personnel on the anthrax vaccine. Even more disturbing was the fact that only 7% of the respondents felt that they had the freedom to refuse the anthrax vaccine without fear of reprisal.[168] The AVIP was reinstated as mandatory in 2007 but only for soldiers entering 'high risk' deployment areas.[169] The anthrax vaccine that is under current use by the DoD is called *BioThrax*. It has been administered to over 3.3 million people,

mostly members of the armed forces and other high risk government employees.[170, 171] Before moving on to the next topic it should be noted that once a soldier enlists or earns a commission as an officer in the military they are subject to the Uniform Code of Military Justice (UCMJ). Soldiers who refuse a lawful order, such as receiving a mandatory vaccination, are subject to disciplinary measures which may include jail time, loss of rank, loss of pay, and possibly dishonorable discharge.

D. Legal Guidelines Governing Human Subject Research

There are a number of other relevant laws and regulations governing human subject research in addition to those discussed in the preceding paragraphs. The following chronological list combines these and provides a brief description of each. Parasidis is critical of many of the laws that surround human subject research in the military because he believes they are confusing and can be abused. Some of the recommendations that he offers include classifying soldiers as a vulnerable population and greater clarity in the laws. He notes, "Taken together, in the context of human subject research protections, the military biomedical complex presents a case where the exceptions swallow the rule."[172] The list below is not meant to be exhaustive in nature but only to provide a general overview of the topic and prepare the reader for many of the ethical and legal guidelines that they may come across related to human subject research and HE in the military.

Chronological List of Laws, Policies, and Ethical Guidelines Related to HE

- 1947—The Nuremberg Code outlines 10 principles that must be followed when engaging in human subject research.
- 1948—The Universal Declaration on Human Rights champions the cause that all individuals are equal in dignity and rights.

- 1949—The Geneva Conventions ban medical and scientific experiments that are not in the interests of the POW.
- 1950—*Feres v. United States*. The US government is not liable under the Federal Tort Claims Act (FTCA) for injuries sustained as a result of negligence of other members of the military.
- 1953—The Wilson Memorandum called for changes to human research trials most notably obtaining voluntary informed consent from soldiers and civilians prior to human subject research.
- 1964—The Declaration of Helsinki set forth ethical principles to help guide the medical community.
- 1972—The Biological Weapons Convention bans the use of biological weapons for the good of humanity.
- 1974—(45 CFR 46) Health and Human Service Human Subject Protection Regulations. Federal framework created governing human subject research wherein Institutional Review Boards (IRB) are utilized to review research protocols.[173]
- 1974—National Research Act. Public Law 93-348, Title II Protection of Human Subjects of Biomedical and Behavioral Research. Created the Commission that later releases the Belmont Report.
- 1977—Geneva Conventions Additional Protocol I noted that informed consent was necessary to carry out medical or scientific experiments on human research subjects.
- 1979—The Belmont Report called for three ethical principles to act as a guide for biomedical ethical research (1) respect for persons, (2) beneficence, and (3) justice.
- 1991—'The Common Rule' expands upon 45 CFR 46 by requiring compliance with basic provisions for IRB's, and informed consent. 45 CFR 46.111(b) Grants additional protections to prisoners, children, and pregnant women and those that are "likely to be vulnerable to coercion or undue influence." Currently applies to 17 Federal Agencies as well as the Central Intelligence Agency via Executive Order 12333, paragraph 2.10.[174]
- 1991—(32 CFR 219) Protection of Human Subjects. This is essentially the DoD's version of the Common Rule.[175]
- 1991—(21 CFR 50.23d) FDA grants waiver to DoD of the informed consent requirements (known as Rule 23d) for the use of investigational drugs and vaccines on US soldiers.
- 1993—Chemical Weapons Convention bans the use of chemical warfare agents.
- 1995—Final Report of the *Advisory Committee on Human Radiation Experiments (ACHRE)* highlighted unethical research experiments of WWII and the Cold War and offered recommendations for future research protocols.
- 1998—DoD commences mandatory Anthrax Vaccine Immunization Program (AVIP).
- 1998—Congress enacts 10 U.S.C. 1107(f) which permits the President of the United States to issue an informed consent waiver for off-label or investigational use of a drug or other medical product as long as it is "in conjunction with the members' participation in a particular military operation."[176]
- 1999—Executive Order 13139 tied together Rule 23d and U.S.C. 1107(f) cited above. Informed consent must be obtained for the use of investigative drugs or drugs unapproved for their intended use unless it is (1) not feasible, (2) contrary to the best interests of the member, or (3) not in the interests of national security.

- 2001—Congress enacts 10 U.S.C. 980 which grants the Secretary of Defense the authority to waive the informed consent requirement if its aim is to "advance the development of a medical product necessary to the armed forces" and "if the research project may directly benefit the subject and is carried out in accordance with all other applicable laws."[177]
- 2004—BioShield Act gives the FDA the authority to permit the use of investigational drugs or medical products during a public health emergency.
- 2004—AVIP becomes voluntary for US soldiers.
- 2007—AVIP becomes mandatory again for those US soldiers deploying to high risk areas.
- 2007—Department of the Army: Guidelines for Investigators. Requirements for U.S. Army Medical Research and Material Command (USAMRMC). This guideline lays out specific requirements that the Army must comply with while conducting human subject research.[178]
- 2011—DoD Instruction 3216.02. Protection of Human Subjects and Adherence to Ethical Standards in DoD-Supported Research. Ensures that non DoD institutions conducting research comply with all DoD regulations. Also provides guidelines for human subject research that is classified.[179]

E. HE Research

In defining HE in chapter two, this dissertation noted in passing that vaccines were not, strictly speaking, considered a HE. Lin, Mehlman, and Abney, are in agreement on this point as well because vaccines are "designed to sustain health, not provide capabilities beyond it."[180] Even under this premise, there is still valuable insight that can be gained from the above examples of vaccinating soldiers with investigatory drugs without their informed consent. As chapter two pointed out, type, degree, and context must be taken into consideration when determining if HE are morally permissible or not. Based upon the arguments of the DoD and the laws and policies cited above, some preliminary observations can be made. For example, if HE become the norm in the military at a future point in time, it is quite possible that some of them may become mandatory, especially if a nation is at war. In the near term however, any such program or HE would likely have to comply with legal regulations already in place (barring the

creation of any new laws or policies). Moreover, it can be argued that the legal precedent has already been set, should the DoD ever need to resort to it.

Specifically, the examples of the PB, BT, and the anthrax vaccines point to legal precedent that permits the use of investigational drugs and medical products in some situations without first obtaining informed consent. After some preliminary testing, might HE in the future be considered an 'investigatory' drug for the sake of testing? If these HE coincide with a timeframe when the US is at war, assuming they are safe or at least 'investigatory', then might they be mandatory for soldiers? A hypothetical example is helpful here. DARPA's program entitled "Metabolic Dominance" is seeking to boost soldiers' endurance and performance by "controlling energy metabolism on demand. An example is continuous peak physical performance and cognitive function for 3 to 5 days, 24 hours per day, without the need for calories."[181] Perhaps in a future war the DoD determines that an adversary already has this or a similar capability and is using it effectively against the United States. The DoD might argue that national security is necessary to level the playing field with the adversary, even if the HE in question is still investigatory in nature and not proven safe. Under what conditions might the US argue for such an exception and mandate HE on soldiers? As the examples above make clear, when national security becomes an issue in any military debate over investigatory drugs, legal precedent sides strongly in favor of the DoD.

Lin, Mehlman, and Abney have also anticipated this possibility and note that the examples of mandatory vaccinations can be useful in gauging how a HE scenario in the military might play out in the future. They note, "At the least, even if not enhancements themselves, vaccinations seem to be closely related and can inform a study on how US law might deal with military enhancements."[182] Williams notes that a difficulty with mandatory HE in the military is

that HE could then potentially be viewed as weaponizing humans specifically to inflict harm on others.[183] Here once again a discussion on type, degree, and context would be helpful to determine whether or not a soldier would be 'weaponized.' Another important consideration is what role, if any, should HE in the military play in the United States' national priorities or strategies. Allhoff and colleagues note that,

> "Might research funding be better spent elsewhere, given that any advantage we gain may be temporary until our enemies replicate our technologies, as they historically do?" or "If enemies are more easily defeated by our super soldiers, will they adapt by taking more desperate measures, such as more aggressively pursuing nuclear or biochemical weapons?"[184]

This is indeed a significant concern in the debate over HE and it begs the question if HE should even be pursued in the first place. Although this dissertation is concerned with *how* HE might be ethically assessed in the military and not *if* HE should be part of the United States' national strategy objectives, this issue deserves some mention here. In the future, might an adversary that does not have HE capabilities simply resort to an all together different tactic against the US? Take for example the increasing incidence of improvised explosive devices (IED) events in the current fight against ISIS in the Middle East. Researchers argue that ISIS has begun to change their tactic from fighting all out battles with coalition forces to resorting to the use of IED's because they are more effective for their cause and disrupt the expeditious advancement of coalition forces.[185]

As briefly highlighted earlier in this chapter, there is already significant research and development being done by DARPA that does not appear to be winding down any time soon. DARPA's annual budget was in the range of $2.87 billion for the fiscal year 2016. With the enormity of their budget in mind, the DoD and DARPA will undoubtedly continue to pursue HE

for military purposes in the future.[186] Related to this is the fact that DARPA is cautious that they comply with all federal requirements related to human subject research and that all corporations wishing to receive funding from them also comply with these requirements.[187]

One example of an oversight office in the military that works directly with DARPA is the Army Human Research Protections Office (AHRPO) which develops policy and maintains regulatory oversight over all research conducted on humans in the Army.[188] Related to the AHRPO is the United States Army Medical Research and Material Command (USAMRMC) which is currently conducting HE research with soldiers at three principal locations. Walter Reed Institute of Research is assessing alertness, attention, and cognition in sleep deprived individuals. The US Army Institute of Environmental Research is assessing cognitive functions, physiology, and performance on Special Operations Forces. Finally, the US Army Aeromedical Research Laboratory is monitoring decision making performance in aviation environments.[189] Other research that is being conducted on HE will be discussed more thoroughly in chapter four, including the role of DARPA in HE research. Here it is sufficient to note that the military uses DARPA to leverage "cutting-edge expert capabilities" from a variety of scientific communities, national laboratories, and universities to drive most of the HE research that is currently being conducted for military applications.[190]

F. Military Personnel as a Vulnerable Population

As the examples in this chapter have highlighted, service members are not immune from becoming the victims of human subject research abuse. In fact, it can be argued that given the nature of their work and the paternalistic nature of the military they ought to be considered a vulnerable population with special rights in place to protect them. Bonham and Moreno are in

agreement on this point and argue that, soldiers can be considered vulnerable populations because the military is a paternalistic organization and soldiers are already prone to giving up some autonomy for the greater good of the organization.[191] There are a number of other ethical issues specific to military members that point to the necessity of them being designated a vulnerable population in federal law as well. For example, *The Presidential Commission for the Study of Bioethical Issues* notes that,

> "Military personnel also might feel pressure to participate in research because of the structured hierarchy in which they live and work. They might feel that participation could contribute to promotions, easier assignments, or special privileges; or that refusal to participate could result in demotions or other punitive measures." [192]

Amoroso and Wenger similarly argue that, "Researchers must be especially cognizant of the hierarchical nature of the military and be certain that it does not interfere with the process of informed consent."[193] Parasidis argues that the examples of the Persian Gulf War vaccines and the AVIP cited earlier in this chapter support the characterization that military personnel should be considered a vulnerable population.[194] This recommendation shall be addressed again in chapter six.

Conclusion

Chapter three has addressed many issues related to human dignity, human rights, and human research in the context of the debate over HE in the military. Section I developed a thorough understanding of human dignity and its foundations. This was essential because of the importance that this dissertation places on respect for human dignity as being a foundational moral principle in determining how HE in the military can be ethically assessed. Section I also highlighted the controversial debate in biopolitics over what, if any, HE society should pursue

and at what cost. Finally, section I noted some of the difficulties and dangers with defining human dignity as varying in degree or quality. Rather, a conception of human dignity as intrinsic in nature was advocated. Section II of this chapter attempted to show how human rights are an outgrowth of human dignity. The UDHR and the UDBHR give evidence to this point and also highlight the advances that have been made in the field of human rights. The views of Nussbaum and Finnis were also briefly discussed in this chapter. These authors and the topic of communitarianism shall be influential in chapter six when the common good is discussed at greater length and recommendations are put forth to advance it through human flourishing.

Section III of this chapter discussed human subject research and its impact on HE development in the military. Historical and legal precedent provided some brief examples of how HE might be implemented in the military in the future. This topic shall continue to be developed in chapters four and five. A list of legal and ethical guidelines were offered to help the reader navigate through the many complex laws and policies related to human subject research and HE. The Nuremberg Code, Belmont Report, and the Declaration of Helsinki all proved instrumental in furthering this goal. The role of DARPA was also discussed at length and will continue to be discussed in chapter four as well. Finally, some preliminary notes on classifying soldiers as a vulnerable population were offered. This shall be one of the recommendations put forth in chapter six. Chapter three, although not always specifically addressing HE in the military, provides the infrastructure and framework for chapter four. Chapter four shall discuss the forms of HE and how other issues such as dual use and emerging technologies, the increasing prevalence of nanotechnologies, and the potential security dilemma of not pursuing HE as a national strategy impact the development of HE in the military.

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Chapter Four: Current Trends & Future Expectations of HE Technologies in the Military

Introduction

Chapter four of this dissertation looks at the current trends and research initiatives that are being undertaken in the field of HE. These HE initiatives are being conducted in a variety of different scientific disciplines including biology, chemistry, neurology, nanotechnology, and genetics. Implicit in these HE initiatives are dual-use concerns because research and development that may be intended for therapeutic purposes may also be used for contrary purposes, such as creating offensive weaponry for a nation. Moreover, the dual-use dilemma often shapes national security policies as leaders must be prepared to react to a variety of threats. Similarly, it is important to determine whether there is any validity to the claims that other nations, such as China and Russia, are also conducting HE research for use in their own militaries. If so, this could create an "arms race" of sorts for HE. How would the United States respond to this potential security dilemma? Could soldiers who have undergone certain HE for offensive purposes potentially violate international laws of war? These are speculative questions by nature but some discussion of them is warranted here in this chapter.

This chapter shall also provide a description of the forms of HE and how, although distinct in many ways, they often overlap with one another. Although much of this chapter is devoted to a cursory overview of the technological trends in HE, many of the ethical issues related to them shall be discussed as well. Chapter five shall expand these issues and address them in greater detail. One such scientific field of study that raises particular bioethical questions related to HE in the military is nanotechnology. Research involving nanotechnology and its potential applications in the military remains a high priority for the DoD. In fact, their proposed

budget is nearly $132 million for nanotechnology initiatives for fiscal year 2017.[1] This is in addition to the funding that DARPA devotes to nanotechnology and its application in the military. Related to nanotechnology is the field of neuroscience which also holds enormous potential for HE not only in the military but for the civilian realm as well. Similarly, the role of pharmaceuticals must be addressed as well as they play a central role in cognitive, physical, and emotive enhancements as well.

In order to have a firm grasp of the current and future trends in military HE, it is also necessary to investigate some of the HE initiatives that DARPA is funding. Some of these HE, should their use become a realistic option, might be touted by military leaders as necessary for the sake of national security. As the discussion on national security, informed consent, and vulnerable populations in chapter three made apparent, it is imperative that policies protecting the subjects of human research be firmly established beforehand. Moreover, in the name of integrity and honesty, there must be oversight, transparency, and collaboration between parties such as DARPA, the DoD, the National Security Agency (NSA), and the FDA amongst others, so that national security concerns remain based upon realistic HE technologies of the future and do not subject humans to an affront of their human dignity or violation of their fundamental human rights.

Finally, for all the futuristic and speculative claims surrounding HE in the military, it is necessary to address the hype surrounding HE in general and their specific use in the military. This is important because it will help discern whether or not there is evidence that supports the claims that are being put forth by members of many disciplines including scientists, journalist, politicians, and bioethicists. Some examples of HE applications for the military that have been proposed include implanted night vision capabilities in soldiers and gene therapy to boost

performance of soldiers during both training and combat.[2, 3] A relevant question that should be asked here is, are these, or any other proposed HE, realistic expectations for use in the military in the future? Given that the current state of HE in the military is in its infancy, a critical evaluation of the field of speculative/anticipatory ethics will be undertaken. This field offers a framework of sorts that will be useful to gauge the authenticity and hype of claims put forth about the current and future capabilities of HE in the military.

I. Research and Development Issues

A. Dual-Use Concerns

What ethical role do scientists have while conducting potential dual-use research and development? Should the results of their research be published in the name of academic and scientific freedom or should national security concerns take precedence? What if a rogue nation or terrorist organization could potentially use the scientific data for nefarious activities against the United States and its allies? These are all relevant questions related to the dual-use debate because they highlight many of the ethical issues involved therein, including the difficulty in balancing the relationship between science and the state. The reality is that the dual-use dilemma is always a possibility within scientific disciplines, especially more recently with emerging technologies. Furthermore, using the results of scientific research for immoral purposes has long been a concern for both the scientific community and for national security policy makers.

In 2005 scientists published research documenting how they had reconstructed the Spanish Flu virus that killed over 20 million people between 1918 and 1919.[4] Selgelid notes that in this case scientists, "argued that medical benefits of publication outweighed the risks associated with terrorism, especially given current concerns about pandemic influenza."[5]

Interestingly, just before this research was published, an American team of scientists published the genome sequence of the same Spanish Flu virus. This team even consulted the U.S. Center for Disease Control (CDC), the National Science Advisory Board for Biosecurity, and the National Institutes of Health prior to publishing the work out of fear for the dual-use potential that inherently existed in their findings.[6] Nonetheless, there was controversy over whether or not the research from these studies should have been published.

The issue of dual-use concerns has garnered much attention in relation to biowarfare. On the one hand, the field of biology has enormous potential for areas such as agriculture, waste-management, health, and HE. On the other hand, results of biological research could be used for immoral purposes as was made apparent in the anthrax attacks in the U.S. in 2001. Tennison and Moreno show that historically dual-use research and development often began as a form of military technology that eventually found its way into civilian hands.[7] Increasingly however, the opposite is turning out to be true. For example Gross notes, "Drugs used to alleviate insomnia or posttraumatic stress disorder (PTSD), the search for the genes associated with intelligence or fear, and computer technologies to treat memory loss were first pursued for therapeutic use before being embraced by the military."[8] Similarly, Juengst and colleagues point out that, "most interventions that might be used for the enhancement of the healthy will be developed under the aegis of perfectly legitimate medical concerns to treat and prevent traditionally defined disease, disability, and suffering in the sick."[9]

Indeed the pharmaceutical *Propranolol*, which is a beta blocker that was originally created to treat hypertension and other heart and circulatory conditions, has been tested and shown to not only treat PTSD but to also prevent it in many cases. Studies show that it can be used as a HE when taken before or immediately after a traumatic event to disrupt the formation

of emotionally disturbing memories, including any psychological trauma of war.[10] Along the same lines, brain-machine interface (BMI) technology was originally created to provide severely disabled or paralyzed individuals with the capability to communicate. Currently, DARPA is conducting research with BMI to create devices that would allow nonverbal soldier to soldier communication on the battlefield.[11] The same dual-use potential applies to genetic engineering which has been used to produce a type of insulin that humans take to control diabetes. In turn, the U.S. military is now investing heavily in research aimed at genetically engineering soldiers to increase their strength, boost immune systems, and block pain receptors so that soldiers can continue to fight in battle after being wounded.[12] Chapter five shall address the above three examples in greater detail but here it is important to highlight that many proposed HE have dual-use origins.

i. Publication of Dual-Use Research

Scientists that conduct potential dual-use research are often placed in a difficult position vis-a-vis the state and national security concerns. Most scientists are not trained to recognize potential dual-use applications of their research and instead often publish their data without concern over how it might be used for nefarious activities. Many proposals have been put forth on how to solve this dilemma. Amidst the two extremes Miller and Selgelid have argued that self regulation by scientists will not work as a remedy, nor will government control of the dual-use research show true respect for academic freedom. Instead they propose a system of institutional and governmental control of dual-use research that would work in unison with an independent oversight authority. In addition, they recommend providing mandatory education and ethics training to scientists to minimize risks and create awareness of potential dangers.[13] Gross acknowledges the strengths of such a system,

> "This arrangement preserves academic freedom, intellectual inquiry, and freedom of communication while making room for the mandatory licensing of some technology and facilities, security clearances for some personnel, and mandatory education to recognize dual-use dilemmas without giving undue weight to national security interests or undue discretion to government authorities."[14]

As has often been noted, in many cases it is not the HE technology that is inherently immoral. Rather the ways in which it is applied are what often create an ethical dilemma. To this end, many scientists and researchers are opposed to conducting any type of research that is military related. They argue that science should be used for the betterment of humanity not toward its destruction. Frisina acknowledges this position but argues scientists should make exceptions at times. For example, he believes scientists have a moral obligation to conduct defensive biological research even if the results may inappropriately be used for offensive purposes. He argues in particular that research directed at developing special vaccines for soldiers who are often deployed in dangerous areas is a, "pragmatic and moral necessity."[15]

ii. The Business of HE

Carl Elliot is convinced HE designed for use in the military will inevitably spill over into the civilian market as well. This begs the question as to whether HE will be available exclusively on the black market or partially under some form of government regulation. He provides these words of caution, "The pharmaceutical industry is now the most profitable and politically powerful industry in the United States. It also has a huge financial interest in creating a demand for enhancement technologies."[16] Lucas agrees with this assessment and notes that there are hidden financial and political interests that are driving emerging technologies such as HE. These interests may eventually "underlie policies and attitudes towards the risks posed by new military

technologies, as well as induce scientists and engineers themselves to undertake projects concerning which they may personally harbor deep moral reservations or misgivings."[17]

This dissertation proposes that the military, rather than the civilian realm, is an appropriate medium for certain types of HE to be initially introduced. This topic shall be addressed in further detail in chapter five. Here it should be highlighted however that it is not just the military that hopes to reap purported benefits of HE because civilian research into HE is also growing at a rapid pace. According to some experts in the HE research field, this is due to four primary factors: (1) global competitiveness, (2) brain drain/depopulation economics, (3) national security concerns, and (4) quality of life/consumer life-style demands.[18] Moreover, the justification for use of HE exclusively in the military will be hard to overcome in western democratic nations that champion individual liberty and autonomy. On this topic Moreno is on point, "If it becomes acceptable to enhance civilians, then it would be hard to explain why national security agencies should be barred from giving war fighters an edge. And if it is not acceptable to enhance civilians, a special case might still be made for tuning up military personnel."[19]

B. National Security

The historical discussion concerning human subject research in chapter three highlighted the length that a nation and researchers may be willing to go to when there is the perception, real or conceived, that national security is at stake. Similarly, recall the discussion on the ethics of torture from chapter two as well. Indeed, national security can be a dangerous justification if there are not safety protocols in place to protect soldiers, combatants, noncombatants, and the nation from a host of unwarranted actions. National security should not be a blanket term for

permitting an 'anything goes' mentality from the military or the government. Parasidis has noted that "Military exceptionalism is largely based on the notion that collective interests trump individual interests in matters of national security. If history is any guide, there must be limits to this principle."[20] As the National Research Council's 2009 report entitled, *Emerging Cognitive Neuroscience and Related Technologies* makes apparent,

> "Serious contemporary ethical discussion of neuroscience and national-security policy carries an unusual historical burden….Proponents of science may well argue that neuroscience promises to enhance rather than undermine dignity and autonomous choice, but that point of view is not always the prevalent one, especially when national-security goals are viewed with suspicion."[21]

Moments of crisis are not the appropriate time to have such debates. As previously noted, it is imperative to have policies in place with proper oversight to protect individual rights and the common good of the nation. To this end, chapter six will offer some conclusions and recommendations on how to approach issues of national security as they relate to HE use in the military. Similarly, there is concern over how the physical removal of soldiers from the battlefield, might impact international law. Traditionally, soldiers have experienced war in a type of unique interaction between enemy combatants and themselves. DARPA is pursuing ways to overcome this to permit the soldier to still be able to control the battlefield effectively while being physically removed from combat. Bess highlights this reality by noting,

> "We are gaining an ever more sophisticated understanding of how the human brain works, how the nervous system and sensory organs function. We are building ever more powerful robotic and information devices. And, most significantly, we are getting better and better at linking these two realms, human and machine, and teaching them to work as one. Over the next few decades, these functional hybrids will become more and more a part of our lives."[22]

This prospect is enticing to military and political leaders for a variety of reasons. Most obviously, it removes the soldier from physical danger. But there is more that should be said about this issue as well. The mere fact that soldiers have been traditionally placed directly in the path of danger during war to gain the strategic advantage should theoretically serve as a caution to waging war. Leaders making such decisions are forced to contemplate the ramifications of war on its citizens and the potential number of soldiers that may lose their lives in the conflict. Political and military leaders who are entrusted with caring for soldiers and commanding them in battle would be wise to continue to consider these risks. However, the types of HE being proposed and researched may in fact make the decision to wake war easier given that soldiers need not be on the battlefield. This should be encouraging on the one hand because it could result in fewer deaths. However, it can be especially troubling as well if some of the nations waging war don't have access to this particular technology. In these cases, the playing field may not be level so to speak. This could lead to the cheapening of war because there is no longer any risk to loss of life and it could also reflect a failure to uphold human dignity. Something very hallowed is lost if warfare is waged in this manner. The decision to wage war might no longer be based upon profound reflection, instead it might become commonplace.

With the rapid increase in emerging technologies effecting nearly all aspects of life, including agriculture, labor, transportation, defense, and health among many others, national security claims can come from a variety of fields other than those related to the military. For example a JASON report entitled, *Imported Oil and US National Security*, addressed the issue of oil and energy policy in the U.S. as it relates to issues of national security.[23] Similarly, Katz and Singer have shown the impact that health and national security concerns can have on nations as they develop foreign policy.[24] The focus here in this part of chapter four will be on national

security concerns as they relate to HE. In the field of HE, one such concern would be the classic security dilemma of falling behind an adversary that is preparing to employ HE in the military. McIntosh, speaking on the competition between nations to acquire HE, believes, "This security dilemma, plus the nature of the technologies themselves, makes it virtually certain that attempts at regulation will fail. Instead, we should expect "arms races" of quantity and quality of improvements, complicated by differing conceptions of what improvement means."[25]

Arguably, if the U.S. falls behind on research and development of HE it may risk its own security or at least its role as a global superpower may be threatened. Moreno agrees that a sovereign state such as the U.S. has the right to pursue HE as a way to augment its military and boost its security. However, he also points out that for the safety of all involved there must be maximum transparency and accountability in the research and development of HE. Recall chapter three's evaluation of the AVIP program. After the anthrax attacks in 2001 in the United States, there was global concern over how a nation should prepare itself for a bioterrorist attack. The United States reacted swiftly by increasing biodefense spending from $414 million in FY2001 to $7.6 billion in FY2005.[26] Enemark has shown that much of the research and development in biodefense at this time was in fact defensive in nature. However, he argues elements of it were offensive in nature as well which put the United States in the precarious position of possibly violating the BWC and undermining its own integrity on the international scene.[27] Likewise, transparency in HE research and development are essential to the extent possible. Sprinkle has also recognized the value of transparency in research and development. He recommends the creation of a "Biosecurity Trust" which would be a transnational, nongovernmental life-sciences organization that would conduct ethical research in hopes of discouraging research that is offensive in nature or in violation of the BWC in any way.[28]

Along these same lines, Lin has pointed out that soldiers who undergo HE may in some instances violate international law such as the Geneva Conventions, the BWC, or the CWC. This highlights the reality that many of the more controversial HE that may be used in the military will need to be considered on the basis of *type*, *degree*, and *context* (as discussed in chapter two) before determining if they are morally permissible or not. Specifically, Lin is concerned that soldiers who may undergo HE that increase strength, erase fear, or eliminate the need for sleep may be altered in such ways that they are no longer autonomous moral agents and able to take responsibility for their actions.[29] Another example that Lin refers to is a DARPA initiative that seeks to eliminate pain after being injured. Lin argues that if this type of HE becomes a reality, torture as it is understood might no longer be forbidden given that individuals would no longer be able to experience pain.[30] Moreno also points out that the field of neuroscience also has particular relevance to the U.S. military and national security concerns. He notes,

> "The U.S. national security community has good reason to consider whether a field like neuroscience could provide near-term technological surprises at a significant cost savings as compared to traditional weapons systems….If brain research turns out to be as threatening or as advantageous as some think, a tiny investment along the lines of DARPA's standards is, from a defense planner's standpoint, imperative."[31]

DARPA researcher Michael Goldblatt offered a description of soldiers in the future and how they might impact national security. He noted, "Soldiers having no physical, physiological, or cognitive limitations will be key to survival and operational dominance in the future….Imagine the threat of biological attack being inconsequential."[32] Goldblatt was speaking about the prospect of HE in the military and although his comments were made over 10 years ago, the vision of DARPA and the DoD remains to this day. Yet there are many ethical issues raised with the prospect of HE applications in the military as proposed by Goldblatt. Recall the

emphasis of chapters one and two in arguing for the use of HE as a form of deterrence to either eradicate war or lessen the impact of war on nations and individuals. The National Research Council and the National Academy of Engineering, in a work entitled *Emerging and Readily Available Technologies and National Security—A Framework for Addressing Ethical, Legal, and Societal Issues*, raised this particular concern as well in relation to HE:

> "What, if any, could be the application's effect on deterrence? Note that the United States justifies nearly all military programs by their (putatively) enhancing effects on deterrence. But adversaries may not necessarily see U.S. [research and development] activities in the same light, and in fact may initiate their own similar program *because* the United States appears to be seeking a technological advantage."[33]

The potential arms race that may come about because of research and development on HE in the military may in fact already be playing itself out and could serve as a warning to nations that wish to follow suit. For example, a 2008 JASON report noted that, "In facing opponents with access to the most advanced technologies, we must anticipate that many, though not all, of our technical advantages will be fleeting, and effectively countered by the enemy's adaptive tactics."[34] The example of China and its pursuit of HE both in the civilian realm and in the military is helpful to illustrate this point.

C. China as Potential Adversary in the Pursuit of HE

In August of 2016, headlines across the international newswires declared that China would be the first nation to genetically enhance humans according to experts in the field.[35] To many in the field of genetics, this came as no surprise. It was well known that China was fast becoming a genetic powerhouse because they had already sequenced the genomes of a number of living things, including the giant panda, the Arabian camel, the chicken, and the silkworm. In

fact, just a year earlier in 2015, China became the first nation to edit the genes of human embryos.[36, 37] The reason for China's rapid advancement in the field of genetics is due to a number of factors, including legal, social, and economic.[38]

First there is the legal aspect. The government of China has no legal restrictions on gene editing. Furthermore, they provide public funding for scientific research in the field. The United States, conversely, although it similarly lacks legal restrictions on gene editing, does prohibit the use of federal funds for the purpose of genetic engineering on human embryos. In relation to social factors, a 2016 Pew Research study conducted in the United States found that there is considerable opposition to genetic engineering in general and in particular against gene editing to improve traits in designer babies.[39] Conversely, Dalton-Brown has shown that views toward emerging technologies in China tend to be more positive because "innovation is viewed as a good thing" and there is a general "trust in government" that they will do what is best for their citizens.[40] There are also practical economic reasons that corporations conduct much of their scientific research in Asian nations and in China. James Canton, a business consultant and CEO of the Institute for Global Futures notes that drug development and HE testing has shifted to China because it is more cost effective to do testing there than in western nations such as the U.S.[41]

This raises the question of how China's pursuit of genetic enhancements will impact its military operations. In 2015 the U.S. Deputy Secretary of Defense, Robert Work, commented at length on concerns about the pursuit of HE in the military by the Russians and the Chinese. He noted that, "Our adversaries, quite frankly, are pursuing enhanced human operations, and it scares the crap out of us."[42] Work also noted that ethical concerns that exist in the West over HE and their impact typically don't apply to authoritarian governments like Russia's and China's.

Nonetheless, the fact that they are conducting research in the field may force the U.S. into further pursuing HE in order to stay ahead of potential adversaries. When asked whether the U.S. was prepared to go the route of a HE "arms race" Work noted, "We're going to have to have a big, big decision on whether we're comfortable going that way."[43] Of course this leaves open the possibility that the Chinese and the Russians are playing a game of military deception. There is evidence of such tactics by the Chinese in particular in the past.[44] Corrin is helpful here in understanding the different cultural context of the Chinese and their view of "rights" in relation to economic nationalism,

> "China imposes a hierarchy of importance on the fundamental rights. In this hierarchy, economic rights take precedence over civil and political rights….China does not accept the principle of universality and makes clear the conferring of [political and civil rights] will take place according to the level of development of the nation."[45]

Human rights abuses and a failure to uphold human dignity have been some of the consequences of this Chinese policy. What safeguards will be put in place for the protection of soldiers or any other individuals that are subjects in future HE research protocols? How will a nation, such as China, that has a checkered past of human rights abuses address these issues appropriately? Wang and others have highlighted some of these abuses and note that media coverage has been helpful in putting pressure on the Chinese government to address these issues. In fact, the Chinese government in response has begun to increase funding for ethical review of research protocols.[46, 47] Perhaps Russell provides the most appropriate summary of the issues discussed above in this section. She notes, "National security issues challenge our views about freedom and privacy of thought, individual rights, collective rights, governmental duties towards its citizens and other nations, coercion, personal dignity, transparency and science's purposes."[48]

This section highlights the need for an international declaration on the research and use of HE in the military. As noted this shall be one of the recommendations proposed in chapter six. Given the likelihood that HE will eventually be used in the civilian realm, there will inevitably be difficulties with any approach to international regulation of what HE modifications should be permitted in the military. As McIntosh notes, "But unless everyone can be trusted to [only] make such modifications, those who choose another path would have a competitive advantage. In a world of sheep, the wolves rule. The wolves who already exist are unlikely to volunteer to join the sheep."[49]

II. Forms of HE

Lin points out that, "We want our warfighters to be made stronger, more aware, more durable, more maneuverable in different environments, and so on. The technologies that enable these abilities fall in the realm of human enhancement and they include neuroscience, biotechnology, nanotechnology, robotics, artificial intelligence, and more."[50] There are a variety of ways of categorizing the different technologies and forms of HE that are currently being researched. For example, Bess differentiates the technologies being pursued under three major fronts: pharmaceuticals, prosthetics/informatics, and genetics.[51] Sandberg and Bostrom, offer a rough framework where they group HE under the headings of pharmaceutical, cognitive, information, nano, and 'other'.[52] Lin, Mehlman, and Abney present a survey of the current HE technologies that are being researched and group them under four major categories: physical capabilities, cognitive capabilities, human senses, and human metabolism.[53] The taxonomy that this dissertation shall utilize involves separating HE into four forms. The four primary forms of HE are cognitive (CE), physical (PE), emotive (EE), and moral (ME). ME shall not be directly addressed in this dissertation. However, it should be noted that much of the debate surrounding

ME revolve around the same arguments that were put forth in chapter three between bioconservatives and transhumanists. After extensive research, Moreno has pointed out that the overwhelming majority of DARPA's projects and research proposals are either directly or indirectly related to the brain and neuroscience.[54] Thus there will be more examples of CE in this chapter than there will be of PE and EE.

Each form of HE can be achieved through the use of a variety of different technologies and in many ways each form offers different potential applications, should they eventually be applied in the military. Similarly, the forms of HE often converge upon each other and overlap, thus it must be noted that they are not mutually exclusive in the strict sense. This portion of the dissertation will address the forms of HE and then discuss some examples of them more in depth. Thus this section will set the stage for chapter five when the four moral criteria are proposed and applied to the examples of the use of brain-machine interface (CE), genetic engineering (PE), and the pharmaceutical *Propranolol* (EE). The examples set forth in this chapter include some current and futuristic trends of HE that are being researched or implemented at this time. There will be mention of some of the ethical, legal, and societal implications (ELSI) as they relate to these technologies as well but the bulk of ELSI shall be addressed in chapter five.

The different HE technologies are important and are often directly influenced by what military leaders and strategists speculate the future of warfare will entail. Many of their decisions depend upon what results scientists can produce from their data. For example while speaking about CE, Forlini and colleagues note that "the possible outcomes and impacts of promoting or restricting research on the efficacy of cognitive enhancers are largely speculative."[55] Nonetheless, there must be some attempts at what the future of warfare is reasonably expected to entail. The Army Capabilities Integration Center (ARCIC) along with the Army Training and

Doctrine Command's Future Warfare Division (TRADOC) are currently working on a comprehensive study of the future of warfare. The Army study is entitled, *Unified Quest*, and it is "designed to explore enduring strategic and operational challenges to identify issues and explore solutions critical to current and future development."[56] *Unified Quest* holds a variety of seminars every year that are related to the future of warfare. Most recently in December of 2016, they held a seminar entitled "Human Performance" where they looked at the changing character of war and how the Army will fight between the years 2030 and 2050.

In many ways the task of *Unified Quest* is to assess what warfare may look like and develop a strategic vision of what projects (including HE's) need to be implemented in preparation for that type of future. Whether or not their vision and the research that is in line with it actually becomes a reality will remain to be seen. This highlights the fact that, true to their mission, the DoD and DARPA will continue to conduct and fund HE research that may often fail. Preparation and research are nonetheless essential so that a nation is not left with a national security dilemma. However, as this dissertation has already noted, HE research and application must adhere to accepted paradigms such as international law, human rights, just war theory, military values, and most importantly upholding human dignity. Moreover HE must also adhere to the four moral criteria that will be proposed in chapter five.

A. Cognitive Enhancement (CE)

Research is currently being conducted with a number of different technologies to achieve cognitive enhancement (CE). These include the use of pharmaceuticals (neuropharmacology), brain imaging, surgical and non-surgical modifications, BMI, and genetic engineering amongst others. CE are enticing to military leaders because they hold the potential to expand upon the

cognitive strengths and develop the weaknesses of soldiers. Similarly, CE might allow soldiers to gain, process, store, retrieve information, retain memory, and multitask more efficiently. It should be noted that CE are not a novel HE for soldiers, as pharmaceuticals in the form of "go pills" have been prescribed to military aviators since the 1990's.[57] A section of this chapter shall be devoted exclusively to pharmaceuticals because this is the most prevalent medium currently used to achieve HE. Nanotechnology shall be discussed later in this chapter as well as it plays a large part in CE in the military. Moreover, there is hope that through the combined use of nanotechnology and pharmaceuticals, drugs can be delivered directly to specific locations within the brain to assist in CE.

Bostrom and Roache believe that, "The medical forms of cognitive enhancement that are immediately on the horizon are likely to yield at best small to moderate improvements in memory, concentration, mental energy, and some other cognition-relevant attributes."[58] This is an important point to make because the issue of hype, which shall be discussed at the end of this chapter, can often convolute the realities of CE or any HE for that matter. Briefly, it should also be noted that DARPA has been testing a CE program entitled *Silent Talk*. This program hopes to allow soldiers to communicate nonverbally on the battlefield.[59] This topic shall be addressed more thoroughly with BMI in chapter five. A Royal Society report entitled *Brain Waves: Neuroscience and the Law* has highlighted similar research initiatives in CE and notes that the vast complexities of the brain hold enormous potential for CE applications,

> "The brain is constantly changing. There is variation between individuals in the structure and function of the brain and the mental processes that underpin behavior. Indeed, everyday experience shows that individuals respond very differently to specific situations. Why is that? Evidence suggests that both genes and the environment, and hence people's unique, individual, lifelong experiences, play a role in modulating behavior."[60]

Later in this chapter an entire section shall be devoted exclusively to neuroscience, here however it should be noted that studies in neuroscience are beginning to give a mechanical understanding of cognition, mental performance, and resilience.[61] Another report issued by the Royal Society entitled, *Brain Waves: Neuroscience, Conflict, and Security,* notes that researchers have begun to understand the neural brain patterns that characterize certain types of behavior. Once these can be identified with accuracy, they may be used for neuroscreening and could help soldiers with cognitive function.[62] A comprehensive list of CE has been offered by Jones, Morris, and Nutt. They caution that society must be on guard from approving CE too quickly because the "initial glorification of novel technology" is often followed by the realities of long term negative effects.[63] Similarly, if CE becomes expected, mandatory, or coerced then this could exacerbate the inequalities in society and in the military.[64] In conclusion to this overview of the form of CE, the words of University of Pennsylvania researcher David Dinges are on point, "Now is the time to have an open and frank discussion on how far we will go as a culture. What are our priorities? How regularly do we want to manipulate our brain chemistry? What are the limits?"[65]

B. Physical Enhancement (PE)

Physical enhancements (PE) could come from a variety of scientific disciplines as well including pharmacological, biological, and potentially genetic engineering. Types of potential PE include ways to improve bodily capacities that increase muscle strength, lung capacity, dexterity, flexibility, coordination, agility, conditioning, and fatigue resistance amongst many others. The obvious appeal to military leaders and to soldiers is that these can help in gaining the competitive physical edge over ones adversaries. Bostrom and Roache highlight that most of the PE tend to be "positional goods" in that the value of them depends upon others not having them.[66] This is

especially the case with genetic engineering. A portion of chapter five shall be devoted to this topic when the four moral criteria are applied to see if the PE genetic engineering would be morally permissible in the military.

Anabolic steroids have long been used by soldiers to boost performance and their use appears to be on the rise especially over the last 15 years during the GWOT.[67] However, the use of anabolic steroids is prohibited in the U.S. military at this time and punishable under the *Uniform Code of Military Justice* (UCMJ) unless they are specifically prescribed by a physician. Other PE research programs that DARPA is currently funding include enabling soldiers to eat grass and other non-digestible plants by converting them to glucose.[68] This could prove valuable to soldiers who would not have to carry heavy meals with them on multi-day missions. Similarly, DARPA is currently funding a $3 billion program entitled *Metabolically Dominant Soldier* which involves research to determine if the use of pharmaceuticals and genetic enhancements could help with regeneration of specific body parts, faster recovery, and the ability to operate without sleep for days on end. The program's director has noted that "My measure of success is that the International Olympic Committee bans everything we do."[69]

It is clear that the ability to control alertness or sleep/wake cycles would be a benefit for soldiers. This type of PE would allow soldiers to return to the fight at a much more rapid pace than currently possible. This would also be particularly valuable to Special Operations units that have extremely high operation tempos. Research has shown that the human body has a variety of needs that include nutrition and adequate rest for recovery. Ruck notes that when the human body is deprived of adequate rest, a number of vital functions do not occur and these negatively impact performance. These negative impacts include cognitive, muscular, and physiological degradations such as high blood pressure, decreased hand-eye coordination, diminished

dexterity, and loss of strength and endurance.[70] Moreover, "It is not only how long a person works or how much rest and sleep he or she receives, but also the type of physical and mental workload that the person is subjected to while awake that determines whether fatigue is present."[71] Another particularly informative study confirmed that insufficient sleep and disrupted sleep patterns are associated with obesity, cardiovascular disease, and cognitive impairment.[72] Interestingly, this same study determined that the biological cause of these negative impacts was the fact that gene expression and amplitude were decreased.[73] This shall be addressed further in chapter five, here it should be noted that this is another area DARPA is seeking to exploit through the use of genetic engineering in the future should it ever become a viable option.

Although not exclusively a PE, genetic improvement of memory in mice was demonstrated nearly 20 years ago.[74] Related to this, a JASON report recommended that the DoD create geno-phenobanks to determine if soldiers may have a genetic component that would be of special relevance to the military. The banking could be used to reduce the medical costs of soldiers who are prone to certain diseases that entail expensive treatment.[75] Perhaps more troubling is the fact that the banking could also be used to remove soldiers from certain military occupational specialties (MOS) or discriminate against them based on the notion of a preexisting genetic condition.

C. Emotive Enhancements (EE)

Emotive enhancements (EE) could be used to target a variety of emotions including mood, anxiety, and empathy. The mechanism used for EE would most likely be in the form of a pharmaceutical. Beta blockers such as *Propranolol* and selective serotonin reuptake inhibitors (SSRI) have all been shown to affect mood, anxiety, and self perception. Similarly, *Oxytocin* and

testosterone suppression treatment have been shown to effect trust, empathy, and moral decision making.[76] Clearly, controlling fear and having the ability to emotionally distance oneself to remain calm in stressful environments has potential advantages to soldiers. Yet it has enormous dangers associated with it as well.

Some scholars have noted that although militaries may attempt to alleviate emotions in their soldiers through the use of HE for the immediate benefit of battlefield trauma, they also need to consider broader societal impacts as well.[77] For example, could EE have the opposite intended effect and actually increase the chances of indiscriminate killing on the battlefield? Will taking an EE diminish a soldier's individual freedom to the extent that they can no longer act as a moral agent and be held responsible for their actions? If so, who is to be held liable for any damage that they inflict? Moreno has similar concerns and notes that the types of HE aimed at emotions might lead to soldiers becoming reckless, undermining their sense of remorse and guilt, and create scenarios where their moral agency may be undermined.[78] The issue of undermining moral agency is one of the four moral criteria that shall be proposed and addressed at length in chapter five.

Ultimately in terms of EE it should be asked, what counts as an improvement in mood or personality? Does the soldier who is overly aggressive need an EE to be more empathetic? Or does the introvert need to be more of an extrovert? Perhaps these questions are more metaphysical in nature and the answers are subject to variations in degree based upon each individual circumstance. Nonetheless, they raise deeper moral questions of the complex role that emotions play in nearly all aspects of daily life. As Bostrom and Roache caution:

> "By what standard do we assess improvements or the reverse in cases where a person's mood or personality does not have a seriously adverse effect on their life? Is it even plausible to

claim that there could be such a standard? If so, what is the best guide to what the standard is and how it applies in a particular case: the opinion of the subject? The opinions of those who interact with the subject? Or something else?"[79]

If the military should determine that it is in the best interests of the nation to emotionally enhance soldiers, there are a number of emerging technologies that might allow this to come to fruition. As the National Research Council's report *Opportunities in Neuroscience for Future Army Applications* makes clear, "Genetic markers, neurohormones, and brain imaging are emerging as sources for biomarkers that may prove to be reliable indicators of a neural state when individuals make choices—that is, they can signify behavior underlying the emotional and subjective elements during decision making."[80] This statement once again highlights the overlap that often occurs between CE, PE, and EE. The statement also highlights that the issue of genetic screening has been gaining popularity as of late. Howe has proposed that soldiers who experience combat fatigue might be able to be excluded from certain combat roles based upon a genetic screening that shows whether or not they are prone to psychological disorders or emotional distress.[81] Similarly, recent research suggests that it may be possible to diagnose and predict the risk for PTSD based upon the isolation of mitochondrial genetic variants.[82]

Donovan has noted that recent studies show that the beta blocker *Propranolol* may be able to disrupt the formation of emotionally disturbing memories when taken within a few hours of a traumatic event.[83] This could potentially be an effective preventative measure against the occurrence of PTSD. It may also have a profound impact on health care given that the Veterans Affairs (VA) notes that anywhere from 11-20% of Iraq and Afghanistan veterans have PTSD episodes every year.[84] Other journalists have attempted to show that the issue of overcoming PTSD is often more complicated than simply using an EE. Indeed the outbreak of PTSD after the Vietnam War may have been caused by the abuse of both CE and EE in the form of

pharmaceuticals. Kamienski notes that the pharmaceuticals did not eliminate the cause of stress and psychological pain associated with war but only treated the symptoms which eventually led to widespread outbreak of PTSD in returning veterans after they stopped taking the drugs.[85]

To be sure, many individuals and soldiers suffer from the traumatic effects of war and the question of whether pharmaceuticals are appropriate for treatment is important. It is equally import however to note that there may very well be unforeseen side effects from this type of treatment for PTSD. This issue shall be discussed at length in chapter five, here however the words of Bostrom and Roache are on point,

> "It is, other things equal, preferable to experience states like happiness, satisfaction, and love than states like sadness, frustration, and grief; yet experiencing undesirable states can improve our understanding of ourselves and others, and give our personalities a richness and depth that they might lack were we only ever to experience "positive" emotions."[86]

III. Nanotechnology and its Impact on HE

Nanotechnology involves the use of extremely small materials across all scientific fields including chemistry, biology, physics, materials science, and engineering.[87] The nanomaterials created through the use of nanotechnology are invisible to the naked eye and are often created one atom or molecule at a time.[88] The benefits and dangers of this type of technology speak for themselves. It is important to highlight that for all the potential that surrounds nanotechnology there is considerable hype and speculation surrounding its future applications as well. This is particularly the case with nanotechnology and its applications toward HE in the military.

A. Nanotechnology as a Tool for Peace or War

Nanotechnology is often discussed in conjunction with the convergence of a number of other scientific fields referred to as, "Nanotechnology, Biotechnology, Information Technology, and Cognitive Science" or the acronym NBIC. Nanotechnology could be used for offensive purposes by enhancing soldiers as they prepare for combat. Conversely, it could be used for defensive purposes to boost the health of soldiers. To what extent a nation uses them for offensive or defensive purposes is subject to a nation's strategic objectives. Leaders who make such decisions have an opportunity to use nanotechnology in the military to uphold human dignity and work toward the goal of eradicating war. On this issue Shipbaugh points out, "Some types of nanotechnology might provide pacifists with nonviolent tools for their protection and thwart offensive acts without resorting to offensive acts. An example is a detection system that combines great situational awareness of threats with extremely strong defensive capabilities of protection against those threats."[89] Yet nanotechnology is also a field that potential adversaries are using as well and it could be used to promote warfare rather than prevent it. Blake and Imburgia note that China and Russia are "openly investing significant amounts of money in nanotechnology."[90] On the topic of nanotechnology and an adversary's pursuit of it for use in the military Lin notes,

> "Nanotechnology, then, has the potential to take military force into the next generation and beyond. And to the extent that a balance of military powers around the globe is needed to maintain some semblance of global security or peace, nanotechnology could disrupt this balance, if it is developed unevenly by current military powers."[91]

Moreover, as the report *Emerging and Readily Available Technologies and National Security* made apparent,

> "How could the application affect the adversary's perception of the United States? For example, the application might instill a fear in the adversary that would inhibit the adversary from taking action against the United States, or it might instill a resentment or hatred that might inspire still others to take additional action against the United States."[92]

There is potential that such an "arms race" in nanotechnology with adversaries might serve as a catalyst for the creation of a new international treaty on war given that nanoparticles and nanoweapons would redefine how nations currently wage war. To kill an adversary in war with a nanoweapon might be illegal according to some scholars. Conversely as we have pointed out already, a HE created through the use of nanotechnology might also remove the soldier from combat altogether and save lives. Allhoff, Lin, and Moore have highlighted these points and offer particularly valuable insight on this issue,

> "However, it has also happened that democratic nations, in which the vast majority of nanotechnology research and development is being done, have a low tolerance for casualties in military actions. With nanotechnological developments making it easier to protect, defend, and otherwise shield soldiers and populations from taking casualties, this tolerance will probably become even lower."[93]

If the approach of using nanotechnology to remove soldiers from the battlefield is pursued, it could lead to an "arms race" of sorts similar to that of the Mutually Assured Destruction (MAD) nuclear policy of deterrence which was promulgated by the United States and the Soviet Union during the Cold War. Shipbaugh however notes that there are important distinctions that must be made between the use of nanotechnology for HE and the use of nuclear weapons in warfare,

> "Nuclear weapons are clearly valued for their extremely large energy outputs. They are very attractive to the offense even if they serve the purpose of defense. Nanotechnology evokes the image of enormously dispersed, small devices and materials previously unencountered by an

actor's adversary. Sensors can protect people against aggression, or be employed to find people to target with weapons."[94]

Blake and Imburgia have also pointed out other potential applications for nanotechnology in warfare,

> "Scientists believe nanotechnology can be used to develop controlled and discriminate biological and nerve agents; invisible, intelligence gathering devices that can be used for covert activities almost anywhere in the world; and artificial viruses that can enter into the human body without the individual's knowledge."[95]

Of course, this once again raises the question of how much credence national security strategists should put into such statements. This issue of differentiating between realistic possibilities versus hype and speculation warrants some attention and will be addressed later in this chapter. Allhoff, Lin, and Moore note that "Nanotechnology enabled human enhancement of soldiers changes how the preparation for the battlefield is done. Instead of building a better environment for the soldiers, it builds better soldiers for the environment."[96] Kosal's remarks are also particularly powerful on the discussion of the potential use of HE in the military through the use of nanotechnology,

> "It is the unique dual-use nature of innovations in nanotechnology that will drive advancements in both offensive and defensive capabilities; in a scenario in which a state heavily pursues offensive nanotechnology, aggression and conflict are more likely to ensue….This leaves the door open for nations to misinterpret capabilities as defensive, offensive, or a combination of both, resulting in a security environment at the mercy of an actor's perceptions. Perhaps more importantly, the incentive will be to hedge and assume that applications are offensive in the face of substantial technical, operational, and strategic uncertainty."[97]

Vincent and Loeve note that the prospect of using nanoparticles to deliver drugs to a specific site of the body is "one of the most attractive promises of nanotechnology today" because this would minimize side effects while delivering pharmaco-active nanomolecules with pinpoint accuracy.[98] Conversely, there is the related dual-use concern that harmful drugs could be administered into the body as well, perhaps unknowingly to the recipients. Allhoff provides a hypothetical example here, "A nano-enhanced chemical such as cyanide could be synthesized in smaller, less detectable amounts in small labs. The current bans on chemical and biological weapons [only] prohibit existing weapons, not future ones."[99] This type of action would not only undermine the BWC and CWC but also make these small scale nanoweapons extremely difficult to regulate. To counter such concerns, the Defense Nanotechnology Research and Development Program is currently funding the development of artificial membranes and synthetic receptors that could be used to detect chemical, biological, and radiological materials.[100] This would be a valuable HE for soldiers to have should the need ever arise in the future to defend against such attacks.

B. Nanotechnology HE Sensors and other Applications for the Military

Nanotechnology has shown that it can be beneficial in civilian health settings and at the same time hold great potential for the field of HE in the military as well. For example, through the use of nanotechnology scientists have developed a chip that can trap and identify cancer cells in patients.[101] Another recent breakthrough involves the creation of a graphene health sensor made of tiny nanoparticles that can be placed like a tattoo on the skin. The sensor can measure signals from the brain, heart, and select muscles, and can simultaneously sense skin temperature and hydration, thus eliminating the need for EKG monitoring devices and other cumbersome health sensors.[102] One can imagine how helpful it would be to have a sensor of this type

implanted in soldiers on the battlefield so that commanders could track their every move and notice a potential health issue before the soldier even shows any external signs.

A similar project was put forth by the *Future Soldier 2030 Initiative* that called for the use of nanosensors to be placed on soldier's uniforms to detect against chemical, biological, radiological, or toxic materials. The military is hopeful that after a toxic agent is detected, nanomaterials in the uniform would immediately begin to neutralize the togic agent.[103] Such an application could potentially be used as a HE as well where nanomaterials are injected into soldiers and could neutralize any toxic agent or pathogen once it came in contact with the skin or entered the body. As some scholars have noted, "We might easily justify the use of nanodevices that patrol our bodies for cancerous outbreaks."[104]

Roco and Bainbridge also believe that the use of nanosensors as a HE in the military holds great potential, "For the individual soldier on the battlefield, nanotechnology-enabled physiological sensors could constantly monitor vital signs and warn of exposure to chemical and biological warfare agents."[105] Allhoff agrees,

> "Even simple detections in fatigue, lapses in attention, and changed in neurological behavior would allow battlefield commanders to have better knowledge about the forces under their command….This can be done first by monitoring the brainwave patterns, but it can also be done more simply by monitoring, in real time, muscle response, eye movement, chemical levels in the body, and other triggers and suggestions of fatigue."[106]

Another breakthrough technology in the field of nanoscience includes the creation of a nanoparticle that "completely eradicates [the] Hepatitis C virus."[107] Hassoun has suggested that carbon nanotubules could provide the basis for artificial muscles that would improve performance.[108] This is another intriguing proposition for military HE that might overcome some

of the concerns of using pharmaceuticals or genetic engineering for PE. At the Massachusetts Institute of Technology (MIT) researchers oversee the Institute for Soldier Nanotechnologies (ISN) which is tasked with engineering innovative technologies to better prepare soldiers to the threats that exist in warfare. Current projects under consideration include the creation of an artificial superior red blood cell, called a respirocyte, which could potentially be used to treat diseases and disorders but could also deliver over 200 times more oxygen than normal blood cells.[109] This has enormous potential to be used as a PE given that it would increase the stamina and strength of soldiers on the battlefield. Other research currently being conducted at ISN includes embedding nanodevices in soldiers to enable controlled release of medications and the injection of nanoparticles that bind together to prevent hemorrhagic shock when soldiers are wounded.[110] Along these same lines, Allhoff, Lin, and Moore have suggested some potential areas of HE applications in the forms of PE and EE,

> "It seems likely that the amount of health and mental care necessary to provide members of the armed services will only increase. As nanotechnology allows for stark increases in the ability to save a life, injuries that once were life-threatening or led to certain death become treatable….Tailoring each treatment to individual patients based upon their DNA and their environment again increases the actual care that each patient needs."[111]

Most of the above cited technologies are still in their infancy and many more research trials will need to be conducted before they would be fielded. Nonetheless, it is easy to imagine how advantageous these HE technologies would be to soldiers and military leaders if adapted to the military.

C. Regulation and Nanoethics

If nanotechnologies were to be used for HE in the military, safety concerns would need to be addressed before FDA approval was granted (barring any of the exceptions for military uses as cited in chapter three related to investigational drugs and informed consent). Wilson notes that the FDA currently has a number of concerns with nanotechnologies being used as HE. These include the effects of nanoparticles on cellular and tissue function, the impact on humans, animals, and the environment, how long nanoparticles remain in the human body, and how nanoparticles might affect blood circulation.[112] Brown and Tvaryanas have also cited concerns over nanoparticles potentially triggering inflammatory responses which in turn have been shown at times to predispose a person to cancer.[113] In light of these concerns, Fatehi and colleagues recommend additional IRB oversight along with the formation of two groups that would work in conjunction to address safety concerns.

The first group would consist of interagency government officials who would bring their own unique concerns related to their field of expertise such as security, labor, agriculture, and defense. The second group would be comprised of outside experts and stakeholders who would likewise bring their concerns about human subject research testing with nanomaterials.[114] This type of approach to oversight could also have usefulness in the military and would promote transparency and instill trust in soldiers and citizens of the nation. Stang and Sheremeta are also concerned with potential health risks to humans and to the environment. They argue that standards need to be examined and redeveloped due to the fact that in the past, "Nanotechnology products have been released on the market after relatively short research and development phases."[115]

Mallozzi argues that "nanotechnology products should not be immune from regulation, but such regulation must be rational and based on science, not perceived fears."[116] Related to this comment, Resnik and Tinkle believe that, "At present, the most significant ethical issues related to nanomedicine involve risk assessment, risk management, and risk communication in clinical trials….[However] in the future nanomedicine is likely to raise questions of physical enhancement."[117] As this section on nanotechnology has pointed out, these concerns over PE are already being raised by a number of other scholars and experts in the field as well. Some of these perceived risks come at a cost to investors and private companies performing nanotechnology research as well. Matthew Nordan, Vice President of Lux Research has noted that, "some Fortune 500 companies….are already backing out of nanotechnology research because of the real and perceived risks of nanomaterials and uncertainties over how they would be regulated."[118] This raises the issue of whether or not these companies may move their research facilities to other nations, such as China, that have fewer regulatory guidelines and fewer protections for human research subjects. Kosal has noted that even if an international regulatory framework was established to overcome some of these concerns, it may be ineffective due to the practical difficulty of regulating nanotechnology based on its sheer size alone:

> "Due to the ambiguity associated with categorizing military applications of nanotechnology as either offensive or defensive in nature, the stability of the security environment will inevitably be compromised. Lack of transparency in the research, development, and manufacturing of emerging technologies also makes it extremely difficult to regulate. Even if a transnational regulatory framework is established, it is impossible to determine if a nation is non-compliant if one is unable to determine the entire scope of research, development, or manufacturing."[119]

Shifting to a related topic here, there is also debate amongst philosophers as to whether or not there are any new or distinct ethical issues surrounding the emerging field of nanoscience.

McGinn takes issue with introducing "nanoethics" as a new field of ethical study. He argues that, "the nanotechnology-related issues claimed to be new or unique amount to old ethical wine in new technological bottles."[120] Grunwald similarly believes that philosophers are already adequately equipped to address the pressing issues proposed by nanotechnology. He points out that, "It turns out that there are hardly any completely new ethical aspects raised by nanotechnology. It is much rather primarily a case of gradual shifts of emphasis and of relevance in questions which, in principle, are already known…."[121]

Ten Have however argues that there is at least one unique ethical issue that nanotechnology raises. The concept of "invisibility" is unique to nanotechnology because it highlights that humans cannot detect nanoparticles using their natural senses. What follows is that individuals might not even know they are coming in contact with potentially deadly nanomaterials.[122, 123] Moor and Weckert do not believe that nanoethics should be a new and distinct field. However, they do highlight that nanotechnology raises particular ethical concerns in relation to privacy and control. "When new technology provides us with new tools to investigate and control others, we use them….That nanochips will be used for spying and control of others is a practical certainty."[124] An extension of this concern is the notion that some soldiers may not approve of their every action being monitored because it could lead to criticism with hindsight from superiors. Similarly, it could lead to the actions of soldiers being taken out of context especially in stressful battlefield situations. In conclusion, this section has raised many practical and ethical issues related to nanotechnology. The answers to some of the more difficult questions are rather complex. The next section of this chapter deals with neuroscience and highlights similarly difficult ethical issues.

IV. Neuroscience

> "Physicians have long tinkered with ways to improve the "human" brain, but as our understanding of that organ's inner workings quickly grows, artificial enhancement is becoming more feasible. Military research is at the forefront of this work, much of it focused on drugs. The goal is to produce a better soldier…."[125]

As Moreno points out in the above quote, the field of neuroscience is unique in its own right and offers many potential applications for HE in the military. The National Research Council's report in 2009 entitled, *Emerging Cognitive Neuroscience and Related Technologies* noted that, "Because the modern world views the brain as the organ most closely associated with personal identity and modern democratic theory values the individual as a rights-bearer and moral agent, there is sure to be enormous societal interest in any prospective manipulation of the neural processes."[126] Similarly, another National Research Council report from 2009 entitled, *Opportunities in Neuroscience for Future Army Applications* notes that the primary way that neuroscience can provide assistance to soldiers is by lessening their cognitive workload "through improved methods for load-shedding as the workload stress on the individual increases beyond a manageable level."[127] Some potential techniques to accomplish this goal include the use of pharmaceuticals, BMI, and brain imaging. One of the more promising brain imaging techniques for use in the military is functional magnetic resonance imaging (fMRI). "fMRI indirectly measures neuronal activity by watching changes in local blood flow around active neurons through the blood oxygen level-dependent (BOLD) effect."[128]

In its practical application, fMRI has shown that brain functioning can be linked to a variety of thoughts and actions.[129] Similarly, research is being conducted by the Army's Institute for Creative Technologies that shows fMRI imaging is able to help understand how pain is

processed by the brain and how signals are sent to the body's pain receptors.[130] A related brain imaging technology is positron emission topography (PET) which can also help in understanding the processes of human behavior and performance. Other CE technologies include neural interface systems (NIS) that are also being tested on soldiers to augment physical capabilities. Tracey and Flower point out that these technologies "manipulate or decode patterns of electrical activity" and have been shown to enhance cognition, improve memory, attention and learning.[131]

DARPA has similarly been funding research to determine whether transcranial direct stimulation (tDCS) can improve learning and sharpen the minds of soldiers on the battlefield. The technology works by sending a low current through electrodes placed on top of the scalp. The current penetrates the skull and affects brain tissue.[132] Similar to tDCS, DARPA is funding research with transcranial magnetic stimulation (TMS) because the technology has been shown to increase creativity in healthy adults.[133] TMS works by placing a magnetic coil above the head while pulses are sent through the brain to see if they can alter the firing rate of neurons. Ultimately, the hope is that TMS can improve cognitive performance in stressful situations or in scenarios when soldiers are fatigued. Most likely this would be accomplished through an external helmet that would deliver the tiny impulses through the scalp and eliminate the need for invasive surgery.[134] As Tracey and Flower have pointed out,

> "As our knowledge of biomarkers associated with the cortical dynamics of learning skills grows, it is reasonable to expect that these biomarkers will increasingly be integrated into neurofeedback systems designed to accelerate learning and proficiency. There is already evidence that this technique can improve performance in athletes."[135]

As has already been pointed out in this chapter, there are often dual-use concerns when conducting scientific research. The field of neuroscience is no exception to the dual-use

dilemma. For example, the *Emerging Cognitive Neuroscience and Related Technologies* report noted that fMRI technology may assist the military in the collection of intelligence from suspected terrorists even though its original intended use was for research, clinical, and commercial applications. The report sets an optimistic tone, "Emergent technology may well help to provide insight into intelligence from captured military combatants, enhance cognition and memory of enemy soldiers…."[136] Yet these same technologies could also be used on U.S. soldiers to determine if they manifest certain personalities or behavioral characteristics. The U.S. military may find these of special use or conversely, even disadvantageous and potentially discriminate against soldiers based on a type of routine neuroscreening. As the *Brain Waves: Neuroscience, Conflict, and Security* cautioned,

> "We are beginning to understand the neural patterns that characterize different risk-taking behavior and how this alters in social context….There is evidence that prefrontal cortex activation differs between individuals who are willing to take risks and those who are more averse to risk taking. When these individuals can be identified with a reliable degree of accuracy, neuroscreening might become routinely implemented in military selection."[137]

This brief section on neuroscience has pointed out only a few of the ELSI at stake. Other issues shall be addressed throughout the rest of this chapter and then more extensively again in chapter five. Blitz offers a valuable caution in this regard. He believes that cognitive enhancement drugs may be enticing as a way to meet our desires and "reshape ourselves" to be "the type of person we wish to be." However at the same time, "They might instead alter or erase these desires" and undermine the "original self that is trying to exercise control over the psyche."[138] In conclusion, Schermer and colleagues are reluctant to offer such high praises for the above mentioned technologies without further scientific research being conducted first. They

argue, “Intelligence is a trait that many would like to see enhanced, but it is a far too complex and multi-faceted trait to be enhanced by one single intervention.”[139]

V. Pharmaceuticals

A. Military Aviators

On April 17, 2002, during the early stages of the war in Afghanistan, two Illinois Air National Guard aviators flying an F-16 fighter jet dropped a laser guided bomb on a suspected al Qaeda training camp. The bomb landed precisely where it was intended to land. Unbeknownst to the aviators, friendly forces were at the camp and four Canadian soldiers were instantly killed. The killings sparked outrage amongst Canadian allies and the aviators were subsequently charged with aggravated assault and dereliction of duty. The U.S. aviators however responded with a unique defense. They argued that the Air Force pressured them to take the amphetamine *Dexedrine*. Thus the impairment of judgment that resulted in the accidental killings of the soldiers that day was a result of the Air Force’s fatigue management program.[140] The Air Force argued in response that the low dosage prescribed to the aviators had been used since WWII and that there was no evidence to suggest that it was the cause of the actions that day. The charges against the aviators were dropped and an ensuing investigation never determined if *Dexedrine* played a contributing part in the death of the four soldiers. Other health care professionals in the military have noted that although taking *Dexedrine* can have side effects such as tachycardia, elevated BP, and restlessness, it still remains a fairly routine drug to help sustain combat performance of aviators in certain multi-day operations.[141]

Russo and colleagues point out that there are essentially two extremes of HE for use in the military. These include those that are “morally benign” and those that are “ethically

challenging" such as neural implants or genetic engineering. They argue that pharmaceuticals "for the sustainment of soldier performance" exist between these two extremes.[142] They also go on to argue that pilots who use these pharmaceuticals as part of their fatigue management program are technically not taking the drug to enhance performance above normal baseline levels but only to "reverse military performance degradation."[143] Moreover, U.S. military aviators are never required to use prescribed pharmaceuticals on any of their missions. Rather it is only available if they feel the need to use it.[144]

Robbins has criticized this position and noted that there are concerns about voluntary informed consent when military aviators are prescribed pharmaceuticals to overcome fatigue and remain vigilant. She argues that aviators and eventually soldiers could be coerced into taking some form of CE without their informed consent based upon pressure from military superiors in their chain of command. She believes that this appears to be the approach that the military is currently taking. "As the military develops alongside technology, what was once considered cognitive enhancement may be seen as standard medical care. Once it becomes understood as standard 'care' or 'treatment', service members would be expected to submit to it and those who refused would face consequences."[145]

An overview of some of the different pharmaceuticals currently being used that could also have HE applications in the military will be helpful at this point. This overview highlights that the pharmaceutical discussed in this section overlap with all of the forms of CE, PE, and EE. However, the bulk of pharmaceuticals that are addressed are CE and PE in that they are often used as "go pills." Methylphenidate is a drug that is found in products like *Ritalin* and *Concerta* and is indicated to treat ADHD and narcolepsy. Dextroamphetamine and amphetamine are found in products like *Dexedrine* and *Adderall* respectively and are also currently used for the

treatment of ADHD and narcolepsy. Similarly, *Modafinil* is a drug found in products like *Vigil* and *Provigil* and is used to treat narcolepsy. All of these pharmaceuticals have been shown to be effective at maintaining alertness and vigilance, improved concentration and memory, and overcoming combat fatigue.[146, 147]

In response to growing concerns over the use of *Dexedrine*, as was highlighted in the above example of the F-16 aviators, some have suggested that *Modafinil* is a safer and more effective CE. *Dexedrine* has been shown to be addicting and could potentially be abused by aviators. Aviators who took *Modafinil* on the other hand, "maintained alertness, feelings of well-being, cognitive function, judgment, risk perception, and situation awareness without the side effects associated with *Dexedrine*.[148] Other studies have found that *Modafinil* improves attention, "while maintaining wakefulness, memory and executive functions."[149] DARPA has funded research on the efficacy of *Modafinil* because, "Eliminating the need for sleep while maintaining the high level of both cognitive and physical performance of the individual will create a fundamental change in warfighting and force employment."[150] Similarly, if aviators are shot down in hostile territory, the use of these pharmaceutical may provide them time to evade capture until search and rescue personnel can safely extract them from the environment. Ferrari, Coenen, and Grunwald challenge the presumption that CE will work more efficiently in the near future. They argue that the "biological efficacy and safety" of pharmacological CE as portrayed by many scientists is not based on "convincing evidence."[151]

In conclusion, a JASON report on *Human Performance* offers valuable insight on this topic,

> "If we take as a given that soldiers on the battlefield will always need to undergo sleep deprivation, sometimes severe, and given that such sleep deprivation leads to large

performance degradation, it follows that any method for improving how soldiers behave under sleep deprivation will have significant consequences for either our own forces or an adversary that learns to solve this problem."[152]

B. Pharmaceuticals and ELSI

Although the preceding paragraphs portrayed a more favorable outlook for the use of pharmaceuticals as a HE in the military, there are still serious reservations over their use. One in particular is the concern that they could be abused and lead to widespread addiction by soldiers. A historical example of the Vietnam War will prove enlightening on this point. The Vietnam War has been dubbed the "pharmacological war" due to the amount of drugs that were taken by soldiers while deployed. In a recent article entitled "The Drugs that Built a Super Soldier", Kamienski notes that 'go pills' were extremely prevalent and that, "The standard Army instruction was rarely followed; doses of amphetamine were issued….like candies, with no attention given to recommended dose or frequency or administration." One Navy commando commented that amphetamines "gave you a sense of bravado as well as keeping you awake. Every sight and sound was heightened. You were wired into it all and at times you felt really invulnerable."[153]

Evidence on abuse of these types of pharmaceuticals is difficult to obtain in today's military environment because soldiers are often reluctant to reveal this type of information out of fear of reprisals. However, Golub and Bennett believe there is evidence that suggests some military personnel use *Dexedrine* as a "go pill" and then resort to drugs such as *Ambien* to help them sleep or benzodiazepine to calm them down and relax.[154] Tracey and Flower also point out that soldiers often use pharmaceuticals without a prescription. For example, they argue that some soldiers use amphetamines and anticholinesterates such as *Donepezil* (used to treat dementia) to

maintain alertness and vigilance, overcome combat fatigue, and improve cognitive functioning.[155] There appears to be some validity to the claims that these pharmaceutical can accomplish what they claim as one study found that *Donepezil* had beneficial effects on retention of complex aviation tasks in pilots.[156]

Although not directly related to HE in the military, it should be noted that there is some legal precedent as to whether or not individuals have a constitutional right to use experimental drugs in the United States. In the 2007 case of *Abigail Alliance for Better Access to Developmental Drugs v. von Eschenbach*, the District of Columbia Circuit Court noted that drug access and use are not constitutionally protected rights and are subject to government regulation to assure their "efficacy and safety."[157] As chapter three pointed out in the discussion of mandatory vaccines for soldiers, the terms "efficacy and safety" may be irrelevant if national security concerns are involved.

Russo and colleagues have offered five principles to act as guidelines to ensure the ethical utilization of pharmaceutical CE/PE in the military, and in particular for military aviators:

(1) The use of the compound is truly informed and voluntary,
(2) The medication itself is safe and can be safely used within the context of the environment,
(3) The intended use is consistent with its dosage and pharmacological function,
(4) The pharmaceutical is used with appropriate medical supervision, and
(5) The non-pharmacologic alternatives have been fully utilized.[158, 159]

Roedig fundamentally disagrees with the approach of Russo and his colleagues. He argues that prescribing CE is unethical and immoral because it is against the indication of the medications and it undermines the rules and values of western democratic nations. As an alternative he believes that only caffeine "is acceptable to maintain sustainability in an

operational environment."[160] Moreover Roedig notes that the United States is currently the only major world power that authorizes the use of amphetamines to counteract combat and aviation fatigue.[161] Others have argued that more extensive testing of the different pharmaceutical CE needs to be done because "no one wake-promoting substance appear[s] as yet to ameliorate the variety of higher-order cognitive deficits resulting from inadequate sleep."[162]

C. The use of Pharmaceuticals as a form of Cheating

Is it considered "cheating" if a nation resorts to the use of HE to gain the military advantage over its adversary? This might seem an odd question in a society that is used to hearing the old adage "All is fair in love and war." Strictly speaking, cheating comes down to a matter of fairness and following the established rules of a game. As chapter two highlighted however, there are rules to war. The *Jus ad Bellum* and *Jus in Bello* as well as other international humanitarian law govern warfare and place constraints on how war is waged. These boundaries are beneficial to the extent that they uphold human dignity and promote human rights. Caldwell notes that, "The fact that cognitive enhancers provide a tactical advantage over our enemies is not considered cheating any more than the fact that our use of superior night-vision technology offers a tactical advantage."[163] Jaeger, addressing ethical concerns with CE, believes that, "One does not normally think of performance enhancement as "cheating" in a military operational context; rather, the search for asymmetric advantages, within the bounds of the Law of War, is both good strategy and sound tactics."[164]

Approaching the issue of "cheating" from a different angle, it can also be argued that the United States publishes much of its research on pharmaceutical performance enhancers in open sourced scientific journals, and adversaries have this information at their disposal should they

choose to use it.[165] However, publishing could prove detrimental of the United States because there is the potential for an adversary to exploit the information. Related to this topic, a JASON report noted that, "the US military should maintain a strong, technical awareness of the medical and popular use of neuro-pharmaceuticals in the US, and develop intelligence about popular and military applications in potential adversaries' cultures."[166]

In conclusion, it should be noted that although war does have rules that need to be followed, it is not a game like chess or backgammon. In war, the survival of the nation may well be at stake. Caldwell, speaking on the use of pharmaceuticals for aviators to overcome fatigue, echoes a similar sentiment, "When considering the military's position on stimulant use, one must remember that combat is not a sporting event but an unpredictable, life-threatening, stressful, and fatiguing endeavor calling for the employment of every reasonable aid to success…."[167]

VI. DARPA and HE

A. DARPA and ELSI

DARPA's Defense Science Office (DSO) oversees much of the research on HE and collaborates with other government officials in support of national security.[168] Although there is limited open sourced ELSI information on DARPA and their practices, their former director, Anthony Tether, gave an interview before he resigned from that post which offers some insight into their approach to ethical issues related to HE. In the interview he noted that most of DARPA's performance-enhancement projects, if successful, would take decades before they were put to use on the battlefield. Tether also pointed out that DARPA is very concerned with ethics especially as it relates to the protection of humans who volunteer to be research subjects. Moreover, he noted that DARPA requires a second federal IRB to evaluate all research proposals

involving human subjects before approval is granted and funding released.[169] Similarly, DARPA does have an official statement in regards to ELSI on its webpage, although it does not go into great detail regarding its research practices. The statement reads in part,

> "….DARPA is committed to addressing the broader societal questions raised by its work and engaging those in relevant communities of expertise to provide context and perspective for consideration. DARPA works vigorously within the law and regulations….In new and unchartered territory, the Agency engages a variety of experts and stakeholders with varying points of view—both to hear what they and their professional communities of practice have to say and to help convey to those communities DARPA's insights about what technology can and cannot do."[170]

The following overview of DARPA's research programs is not meant to be exhaustive in nature. Many of these programs have expired and funding has been discontinued. However, DARPA often reintroduces an expired program under a new name. Some of the following programs have already been discussed above in this chapter while others have not. It should also be noted that 85% of DARPA's projects fail, but as one researcher pointed out, "You've got to expect a high rate of failure because the payoffs are fabulous."[171]

B. DARPA Research Programs

- *Enabling Stress Resistance* program hopes to implement cognitive, behavioral, and pharmacological interventions that will "prevent the deleterious effects of stress on warfighters."[172] Similarly, the *Enhanced Human Performance* program seeks to "exploit the life sciences to make the individual warfighter stronger, more alert, more endurant, and better able to heal."[173]
- The *Neuroscience for Intelligence Analysts* system uses electroencephalography (EEG) to detect brain signals that correspond to certain perceptual recognitions, sometimes unconsciously, when reviewing satellite imagery. Preliminary studies show that analysts

may be able to increase their capabilities of detecting potential targets by 300%.[174] The technique has undergone some improvements including utilizing a neural marker that triggers real time feedback to the wearer, thus "alerting them to the presence of a target and reducing the probability that it was overlooked."[175]

- *Targeted Neuroplasticity Training* (TNT) is investigating non-invasive methods that can "deliver peripheral nerve stimulation that enhances plasticity in brain regions responsible for cognitive functions." It is hoped that this training could increase the rate of learning and assist in memory retention.[176]
- *Cognitive Technology Threat Warning System* uses a helmet mounted EEG device to monitor brain activity to assist the soldier in detecting a potential threat anywhere in a wide field of view. The soldier would then be alerted to the threat and could address it or alert others to its possibility.[177] A similar program entitled *Human-aided Optical Recognition/Notification of Elusive Threats* (HORNET) was funded by DARPA and researched by Northrop Grumman in 2010 to investigate whether neuro-optical binoculars can detect enemy threats when the user does not consciously recognize them.[178]
- *Augmented Cognition* (AugCog) program used a number of neural indicators to control a BMI system that was connected with other computer information systems.[179] When the indicators warned of overload stress on the research subject, a trigger would be sent out to the management system as an alert. Although the program was ended in 2006, similar research is still being conducted under a program entitled *Improving Warfighter Information Intake Under Stress*.[180]
- *Metabolic Dominance* program attempted to create a powerful "nutraceutical"—a pill with nutritional value that would improve a soldier's endurance by controlling metabolism especially when soldiers would be deployed in combat roles for extended periods of time.[181] A similar *Metabolic Engineering* program now seeks "to develop the technological basis for controlling the metabolic demands on cells tissues and organisms" by conducting research on blood and blood products.[182]
- *Crystalline Cellulose Conversion to Glucose* (C3G) attempted to enable humans to eat grass and other non-digestible plants in order to become more effective on the battlefield

and avoid being burdened with carrying heavy amounts of food to sustain performance.[183]

- *Continually Assisted Performance* investigated the possibility of keeping the soldier at peak endurance levels with little to no sleep for up to 7 days.[184] The $20 million program investigated "ways to prevent fatigue and enable soldiers to stay awake, alert, and effective for up to 7 consecutive days without suffering any deleterious mental or physical effects and without using any of the current generation of stimulants."[185] The precursor to this program was entitled *Preventing Sleep Deprivation* (PSD) and in the early 2000's $100 million was spent researching the "prevention of degradation of cognitive performance due to sleep deprivation."[186]
- *Persistence in Combat* is investigating three specific areas that inhibit soldier performance in combat: pain, wounds, and excessive bleeding. The program is looking at developing a pain vaccine that would "reduce the pain triggered by inflammation and swelling" so that the soldier only had "10 to 30 seconds of agony and then no pain for 30 days."[187] DARPA has provided funding to developing a vaccine for this program in collaboration with Rinat Neuroscience (Pfizer owned).[188]
- In 2011 DARPA received $240 million to fund brain research as part of the nationwide *BRAIN* initiative introduced by President Obama to accelerate "the development and application of innovative technologies" and "produce a revolutionary new dynamic picture of the brain."[189] The White House webpage noted that $50 million of the fund was for "understanding the dynamic functions of the brain and demonstrating breakthrough applications based on these insights."[190] DARPA is hoping to develop CE technologies in this field so that they can be customized to individual patients.[191, 192]
- *Prophecy Program* aims to "transform the vaccine and drug development enterprise from observational and reactive to predictive and preemptive by spurring development…[and] predicting viral evolution."[193] McCarty notes that "If militaries can harness the immune system, they will be considerably less vulnerable to biological warfare. This could tip the balance of power away from states intending to implement biological weapons and toward states that have militaries able to withstand these attacks."[194]
- *Electrical Prescriptions* program (ElectRx) aims to improve physical and mental health by targeting the peripheral nervous system to exploit the body's natural ability to quickly

heal itself. The program will use real time biosensors and neural interfaces to target improved physiological performance.[195] The program manager at DARPA, Doug Weber, notes that "The peripheral nervous system is the body's information superhighway, communicating a vast array of sensory and motor signals that monitor our health status and effect changes in brain and organ functions to keep us healthy."[196]

- *In Vivo Nanoplatforms* (IVN) is attempting to create nanoparticles that can treat physiological abnormalities, illnesses, and diseases.[197] The hope is that these could be implanted and provide physiological monitoring of the soldier to keep them free from infectious diseases, especially drug-resistant organisms.

C. Speculative Ethics and the Problem of Hype

"We are at a turning point in history. For millenniums our technologies…have been aimed at modifying our environment. Now, for the first time, our technologies are increasingly aimed inward—at altering our minds, memories, metabolisms, personalities, and progeny. This is not some science fiction future."[198] These words by Joel Garreau can stir mixed emotions in people. But is there any truth to Garreau's claim, or any other claim, about what the future of HE technology holds? Admittedly, this is a difficult, if not impossible, question to answer. The Nuffield Council on Bioethics notes that the three characteristics of uncertainty, ambiguity, and transformative potential make emerging technologies such as HE difficult to govern.[199] The principle of uncertainty is especially important and is directly related to the field of speculative ethics (sometimes referred to as anticipatory ethics). This relatively new field of ethics has garnered considerable attention due to emerging technologies such as HE. Admittedly, speculation is at the heart of many bioethical issues related to technology, not merely HE. The difficulty with HE however, as Jones points out, is that it is often prone to exaggeration. He notes,

> "What is emerging here is an increasingly close relationship between futuristic visions of medical accomplishments, a conflation of such visions with present reality, grandiose visions of human self-modification and genetic perfectibility, and eugenic aspirations. It is within this morass of competing expectations and world views that we encounter the notion of enhancement, because it is viewed as promulgating these far reaching visions."[200]

i. Uncertainty

To be sure Jones' comments are aimed at those who advocate a transhumanist outlook. Uncertainty over what technologies will be available in the future can be both encouraging and troubling to individuals. This in many ways highlights the debate over HE between the bioconservatives and transhumanists that was offered in chapter three. Sollie has pointed out that in order to solve the problem of uncertainty, ethicists must assess future technologies based upon scientific knowledge that is at least partially reliable. He notes that the uncertainty surrounding technologies eliminates traditional principle based theories as a foundation for speculative ethics because they are based off of calculable and transparent objects of evaluation. Instead, he offers some questions that should be asked in an ethics of uncertainty or speculation. "Who are the agents that are involved in a particular technology development? What are the consequences of particular decisions during the research and development trajectories? What are possible applications and consequences of new technologies? Who is effected and to what extent?"[201]

These are important questions and they have value in speculating about future technologies, but they also raise questions as to governance and what path a nation should take in pursuing these technologies. Calvert is on point here and notes, "If we merely focus on measurable risks, we cannot ask bigger questions like, is this research field one in which we want to invest society's limited resources? This question demonstrates that technology choice is an ethical issue."[202] Brey has also attempted to solve the problem of uncertainty in the field of

emerging technologies and has proposed a checklist for an anticipatory technology ethics (ATE) approach which includes analyzing a number of ethical principles, issues, and objectives.[203] Guyer and Moreno however argue that bioethicists, and in particular certain bioconservatives like Kass and Sandel, often fail to do adequate research on issues before reporting them to the general public. They note,

> "A common and disturbing feature of the ubiquitous bioethical commentaries is the short shrift—often, complete inattention—given to the feasibility of the technologies under discussion. So many of the commentaries include the caveat "when the technology is good enough" and then carry on with the ethical analyses and risk-benefit assessments. Yet, many of the futurist therapies and fixes are never going to become standard or useful, because the technologies are not now and never will be precise, predictable, and reliably controllable."[204]

Here, Roache makes a valid point by disagreeing in part with the comments of Guyer and Moreno. She notes,

> "Attempting to restrict ethical debate so as to avoid considering unacceptably speculative scenarios would not only leave scientific progress devoid of ethical guidance, but would also rule out some of our most important ethical projects…..what is most important is not that ethicists concentrate on current issues or those that are most likely to arise; but that ethicists, scientists, and others focus on maximizing what is most valuable."[205]

Although the reporting on certain futuristic HE technologies may be suspect at times, there is still value in debating these issues because it continues dialogue among competing philosophical groups. Jones however notes that, the focus on HE and emerging technologies should be grounded in an ethical discussion on the present and not on speculation of the future because, "This would allow us to see that fundamental moral values, such as the benefit of the individual, justice and fairness, are central…."[206] Issues of justice and fairness shall be addressed in greater length in chapter five. Here it should be noted however, that there is concern as to what

technologies may be available for soldiers in the future and whether pressure from superiors will become a concern for soldiers to undergo HE. On this topic McIntosh provides a relevant point, "Competitive pressure may leave [soldiers] with no practical alternative….From the perspective of the military, once one starts down this path there are few logical places to stop."[207] DARPA's former director Anthony Tether took an opposite approach and noted that "There's probably more hype on [Human Enhancement]. You know the old Army saying, "Be all you can be"? That's really what we're doing. We're making it possible for people to be all that they can be, not making them be better than they can be."[208] In a similar vein there is also the concern over safety and whether or not HE technologies that could be applied to the military will be used based upon hype alone before they are adequately and sufficiently validated.

ii. The "If-Then" Fallacy

Nordmann agrees with Guyer and Moreno's statement above and notes that what is often found in the ethical literature over HE technologies is a "if and then" fallacy. He notes,

> "An if-and-then statement opens by suggesting a possible technological development and continues with a consequence that demands immediate attention. What looks like an improbable, merely possible future in the first half of the sentence, appears in the second half as something inevitable. And, as the hypothetical gets displaced by a supposed actual, an imagined future overwhelms the present."[209]

Scientists and ethicists have an obligation to their profession and to society to engage in responsible reporting of current and future trends in HE. Malsch has echoed this sentiment in relation to nanotechnology and calls for more discussion on the ethical issues related to security and societal issues and not just on issues that are hyped out of proportion.[210] Other have argued that discussions on futuristic technology should focus on the most important matters at hand such

as "technological feasibility, societal usability, and desirability of the expected technology….[this will require] a careful and well directed use of both skepticism and imagination."[211]

iii. Hype

It is not the intent of this dissertation to delve too deep into what particular HE technologies are overly speculative or hyped. Rather, the aim is to address how HE technologies can be assessed if in fact they are used by the military. Nonetheless, in this regard the issue of hype is important and must be addressed for the sake of honesty and integrity. Speaking on the emerging field of neuroscience and its potential for HE, the *Presidential Commission for the Study of Bioethical Issues* issued a two volume report entitled *Gray Matters.* The report noted that,

> "Scientific hype in the media or scientific claims that have not been borne out through replication and verified by the scientific community at large can distort public perception…..The responsibility to avoid hype is shared by many stakeholders, including neuroscientists, members of the media, politicians, judges, and the general public."[212]

Choudhury, Gold, and Kirmayer have also attempted to dispel rumors and hype in the HE debate. They address a separate issue that is troublesome for the use of HE in the military. Political ideologies and conflicts of financial interest are a danger to the field of HE,

> "The attempt to exaggerate the utility of neuroscience by putting it at the service of political agendas may yield short-term benefits for researchers seeking funding and for political ideologues who hope to capitalize on public insecurities, but ultimately it seems likely to constitute a serious disservice both to science and to global security."[213]

Hyping a particular HE technology can also result in funding being revoked in the future. If the public becomes overwhelmed with hype the support for such research may be withdrawn by government officials. In regards to nanotechnology, McGinn notes that, "…researchers have an ethical responsibility to avoid legitimizing distorted mass media coverage of scientific or engineering developments by participating in or endorsing such coverage without exercising due diligence about its accuracy."[214] One recent study on the topic of CE found that media coverage has exaggerated the hype over certain new technologies including fMRI and genetic research. In fact the study noted that one-third of the media articles on CE cited no evidence whatsoever for their claims.[215]

Conclusion

Chapter four provided an overview of the current trends and future expectations of HE research technologies. The discussion on dual-use research was important because it highlighted that regardless of good intentions, science could potentially be used for immoral purposes as well. Moreover, in deciding whether or not to publish dual-use research, national security concerns need to be taken into consideration. Although national security concerns hold considerable value they should not be used as a justification to violate human rights or undermine human dignity. The example of China and its human rights abuses against human research subjects, as well as the checkered past of the United States in this regard, all serve as warnings for scientists and leaders who conduct and fund HE research.

Chapter four also compared and contrasted the different forms of HE. The forms of CE, PE, and EE, though distinct, have considerable overlap with one another, as the many examples in this chapter highlighted. This provided the ground work for chapter five that shall look

specifically at BMI as a CE, genetic engineering as a PE, and the use of the pharmaceutical *Propranolol* as an EE. The potential impact of nanotechnology on HE in the military should not be underestimated either. As the discussion above highlighted, nanotechnology can be used as a tool for peace or for an agenda of perpetual war. Although nanosensors hold the potential to provide constant monitoring and real time feedback of many vital statistics of soldiers, there are still safety concerns surrounding such technologies which has led the FDA to take a cautious approach to approving their widespread use. Similarly, given the "invisibility" of nanoparticles, regulation of such materials shall be an extremely difficult task for nations to undertake.

Neuroscience as well holds great potential for HE use in the military. Numerous examples of CE were put forth under this heading in chapter four. Perhaps the largest obstacle to widespread CE use in the military is the fact that the brain is such a complex organ that scientists are still trying to understand all of its intricacies. The use of CE pharmaceuticals in the military has garnered much attention. Although their use as a HE is currently restricted to aviators to help overcome fatigue on long missions, there is some evidence that suggests their illegal use in the military is on the rise. All of the HE technologies addressed in this chapter raise a number of ELSI concerns as well. Ethical issues such as safety, fairness, justice, and informed consent were briefly discussed in this chapter. These and many other ELSI shall be discussed at length and more thoroughly in chapter five.

DARPA's role in funding and providing oversight of HE in the military was also discussed at length in chapter four. Although, as noted above, many of their programs fail, they nonetheless remain the driving force behind the research and development of HE for use in the military. Finally, the issue of speculative ethics and hype were addressed. Scientists have an ethical obligation to conduct ethical research and present their findings in an honest light.

Hyping research only complicates matters and may result in a number of detrimental actions, including the premature use of a HE before it has been adequately tested and the revocation of funding due to a lack of public trust in the endeavor. Although by nature there is much uncertainty surrounding futuristic HE technologies, reporting needs to be based upon an honest assessment of research in relation to the future strategic goals of the military.

Chapter four has now completed the groundwork for this dissertation. The four moral criteria for ethically assessing if HE in the military are morally permissible will now be proposed in chapter five. The four moral criteria of reversibility, upholding moral agency and values, informed consent, and non HE alternatives being exhausted prior to the application of HE use will be applied to the technologies of BMI, genetic engineering, and the use of the pharmaceutical *Propranolol* to determine if these HE techniques are morally permissible. As noted, many of the ELSI issues surrounding HE in the military shall also be addressed in chapter five as well. These issues are important because they highlight the need to uphold human dignity in all aspects of HE research and use in the military. Moreover, they draw attention to the importance of providing individuals with the opportunity to flourish in society, thereby promoting the common good of the nation.

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Chapter Five: Moral Criteria for Military HE and Their Application

Introduction

Chapter five integrates all of the groundwork that has been laid out in the previous four chapters into a thorough and comprehensive analysis of the four moral criteria that are necessary for the use of HE in the military and their application to specific HE technologies. The four moral criteria are (1) reversibility (non-permanence), (2) upholding moral agency and existing military values, (3) voluntary informed consent free of coercion, and (4) non-HE alternatives exhausted first (last resort). Of course, there may be other techniques used to gauge the moral permissibility of HE in the military. However, this dissertation adheres to this taxonomy for a variety of reasons. First, it is believed that most ELSI concerns can be categorized under the broad headings of these four moral criteria. Similarly, the discussion on *type*, *degree*, and *context* that shall be implicit in this chapter fits nicely within this scheme and allows specific examples of HE in the military to be approached and analyzed based upon their relative strengths and weaknesses before arriving at a conclusion on their moral permissibility. Likewise, it allows some flexibility in their application rather than a blanket "yes" or "no" approach to a specific HE technology. This is important because, as has already been noted in previous chapters, it is not necessarily the technology itself that creates the moral dilemma. Rather, it is the application in the specific circumstance (*type*, *degree*, and *context*) that often becomes morally problematic.

As chapter four highlighted, the HE forms of CE, PE, and EE quite often have overlap with one another. However, the HE technologies of brain-machine interface (BMI) for CE, genetic engineering for PE, and the use of *Propranolol* for EE have been chosen because in many ways their overlap with one another is minimal. This will allow for a more robust analysis

of each distinct HE form and technique to the extent possible. This chapter shall also address each of these HE technologies based upon where research is currently being conducted in that field and where scientists reasonably expect that HE technology might be applied for use in the military in the future. Thus by nature, there will be some speculation in this chapter's analysis. However, this shall be minimized to the extent possible to be in accordance with the discussion on speculative ethics at the end of chapter four.

Other ELSI concerns with HE use in the military shall also be addressed in this chapter. These include, but are not limited to safety, autonomy, justice, human rights, and human dignity. All of these ethical issues strengthen the argument that many HE technologies, should they be deemed morally permissible, are more appropriately introduced into the military rather than in the civilian realm. A variety of reasons shall be presented in favor of this argument, but perhaps most importantly this approach minimizes distributive justice concerns by only permitting a small number of soldiers to undergo such HE. This would only be done when national security and the common good are at risk, the four moral criteria presented in this chapter are adhered to, and human dignity is upheld. The types of HE techniques and the number of soldiers that would undergo such HE would of course be subject to a separate debate. This dissertation holds to the premise that the use of HE in the military, if morally permissible, would be the extreme exception rather than the rule. However, a preliminary suggestion that might be put forth for the sake of argument would be that these HE technologies only be made available for use within a limited number of Special Operations units.

Allhoff, Lin, and Moore have pointed out the high degree of uncertainty that exists within the field of HE, especially their use in the military, "No one could predict with much accuracy how the Internet Revolution would unfold, raising policy issues from privacy to piracy and

beyond, the same is likely true with the Human Enhancement Revolution….However, this does not mean that we should not attempt to address the issues we are able to anticipate."[1]

Makridis addresses the fact that there is a real danger that lies beneath much of the ethical and practical uncertainties involved with HE in the military. On the one hand, the United States could build upon their already superior fighting force by utilizing HE to improve cognition, and become more mentally and emotionally resilient. HE could be used to enter into a greater peacekeeping role or conversely they could, "make war more likely, heightening the amount of international conflict."[2] The implications of such a scenario would be far reaching. Russo has proposed that the United States must take the moral high ground in this regard. It is imperative that, should HE be morally permissible in the military, "human dignity be respected at all levels from ground infantry to the highest levels of leadership…in the U.S. military [this] serves as the highest standard for ethical guidance."[3]

I. The Four Moral Criteria

A. Reversibility (Non-Permanence)

Reversibility is imperative because it is able to overcome a variety of ELSI concerns. Recall the wide variety of military values and virtues discussed in chapter two such as loyalty, duty, respect, and honor. While a soldier remains in the military, these values become a part of their lifestyle and are foundational as to how they identify with other members of the military. In a similar manner, civilians often associate these values with the prototypical soldier. When soldiers fulfill their military obligations and transition back into civilian life, these values form their outlook and in many ways transition with them. Indeed many employers find these values and other military skills, such as leadership, a benefit when seeking to add military veterans to

their workforce. According to 2014 statistics, approximately 19.4 million Americans are veterans, which is nearly 7.5% of the population that is 17 years and older (the minimum required age to serve).[4] This is a significant portion of the U.S. population. Reversibility allows these soldiers to transition back to civilian life without any long term side effects of the HE.

Other relevant questions that might be asked in relation to reversibility include, would civilians view soldiers who have a permanent HE as having an unfair advantage? Would soldiers enlist in the military just to have the chance to take advantage of the use of HE technologies? What should be the policy if a soldier goes absent-without-leave (AWOL) or asks to be discharged? Would civilians view soldiers who have undergone a HE as cheaters? Would there be resentment toward soldiers? O'Brolchain and Gordijn refer to this last question as the *resentment argument*, "From the perspective of people with enhancements, those without enhancements could be seen as imposing unfair costs to society."[5] Similarly, Wilson notes that if HE, particularly those that come about through the use of nanotechnology, are permanent then they may result in alienation from fellow soldiers and also civilians who may show signs of resentment toward them for having undergone a HE technique.[6] Perhaps most relevant, would civilians treat enhanced soldiers as less than human and deliberately question their inherent dignity? Thus it can be argued that reversibility upholds the dignity of the soldier by allowing them an open future upon their return to civilian society.

In relation to a soldier's individual role in the greater common good of the nation, it is similarly imperative that a soldier be able to flourish in the pursuit of the basic human goods once reintegrated back into civilian society. This topic shall be further addressed at various stages of this chapter as well. Here Jonas and colleagues have appropriately pointed out that, "Optimal performance during battle and deployment must be balanced against health and

sustainable social functioning upon re-entry. This requires a holistic framework wherein all dimensions of human flourishing are addressed."[7] This framework would necessarily include any safety concerns or long term health effects that a HE might have on soldiers. It would also require an evaluation of the soldier for any type of psychological distress that they may be experiencing in preparation for reintegration back into civilian society. Colonel Dave Shunk similarly argues that HE technologies such as genetic engineering might prevent soldiers from flourishing after reintegration back into civilian society at the end of an armed conflict because of the impacts the HE may have had on their overall mental and physical health.[8]

i. Open Future

War is always fraught with uncertainties. If a nation needs to resort to the use of HE in the military then it must ensure that safety issues are overcome, especially in reference to the long term health impacts on soldiers. Depending on the type of HE technology being utilized, other safety concerns might include the health impact of nanoparticles on society and the environment as well. Allhoff, Lin, and Moore note that "As more and more soldiers survive battle and return home, issues of mental health care and readjustment to peaceful society become ever more important. Further, adjusting back to non-enhanced life – for example, going from being "metabolically dominant" to needing sleep – could be traumatic for the soldier."[9] Moreno points out, "Experimental treatments might be acceptable under extreme combat conditions if there was a serious threat and no reasonable alternative to protect the force."[10] This would be especially relevant if HE were introduced into the military as investigational drugs and safety concerns later arose, analogous to the Gulf War syndrome discussed in chapter three. Long-term health and safety issues are also important for the impact that they might have on the U.S. Department of Veterans Affairs (VA) and its ability to provide care for soldiers. As Lin points

out, “Legally and ethically, how safe should these technologies be before they are deployed? What are the additional costs for VA hospitals to deal with adverse health effects from enhancements?”[11]

If soldiers carry the negative effects of HE with them upon reintegration into civilian society, then the military and the nation have in many ways failed to give them the open future they deserve. As Allenby notes, “Technologies that enable more direct design of human bodies and cognition could be very effective for warriors, but if not reversible, they could raise difficult issues for social stability when designed humans return to civil society….It’s a harsh question, but one that should be asked: Will cyborgs be welcomed home from the front?”[12] An open future may also be threatened because identity issues are implicitly involved in the use of HE and, “we should never lightly dismiss concerns about whether drugs are safe and whether people are being subtly coerced into taking them.”[13]

Career soldiers might not be as concerned about the impact of HE in comparison to members of the National Guard or Reserves who instead, “might be legitimately concerned about whether an enhancement would be a boon or a handicap in their civilian job.”[14] On another note, what if a soldier wants to keep a particular HE and refuses to have them removed (if they are surgically implanted)? Would the U.S. force soldiers to undergo surgeries to remove, for example a BMI, or a prosthetic or robotic arm? Discrimination concerns are also important, as Dinniss and Kleffner note that, “If enhanced veterans were to present a significant threat to unenhanced workers in terms, for example, of lost job opportunities, the societal tendency to discriminate against perceived outsiders is likely to emerge.”[15] In conclusion, it should be noted that as long as HE are safe and reversible many ELSI concerns can be overcome and soldiers can have an open future when they leave the military.

ii. Authenticity and Identity

Authenticity and identity concerns have long been in the HE realm as was highlighted in the debate between transhumanists and bioconservatives in chapter three. If HE were to be implemented in the military it might be difficult to differentiate characteristics of specific individuals, depending on the HE technology that is utilized. Although this ELSI may seem remote and futuristic, it is worth some mention here. For example, if BMI's or any other computer interface system were to be used by soldiers for extended periods of time or semi-permanently implanted, "the exclusiveness of possessing particular information would become relative, which in turn would reduce the uniqueness of those people."[16] Conversely, it would be difficult to justify forgoing the potential benefits that might be reaped by soldiers connected to BMI's, such as real time access to information on the battlefield.

On another note, it might come about that soldiers so identify with a HE, such as a prosthetic or brain implant, that it comes to be part of how they *identify* and thus they may make claims to the HE as an integral part of their body or their property. Other CE might not be so extreme nor pose the same ELSI concerns as BMI's. For example, Bostrom and Sandberg note that, "Insofar as cognitive enhancements amplify the capacities required for autonomous agency and independent judgment, they can help a person lead a more authentic life by enabling one to base choices on more deeply considered beliefs…."[17] Dees takes an opposing view and argues that HE may "alter people in ways that take them away from their "true selves" and away from a life of genuine value."[18] Taylor has similarly noted that our genuine authenticity is that which ultimately, "allows us to live (potentially) a fuller and more differentiated life, because it is more fully appropriated as our own."[19]

iii. Distributive Justice

Reversibility also serves the dual purpose of protecting civilians and soldiers from each other. For example, soldiers who would potentially have undergone a permanent HE, would now be introduced into a society with what may be deemed as an unfair advantage. Distributive justice concerns would likely arise out of such a scenario and potentially create a have vs. have-not class structure. This distributive justice concern shall be addressed more thoroughly throughout this chapter when the moral criterion of reversibility is applied to the HE technologies of BMI, genetic engineering, and the use of *Propranolol*. However, it is important to note here that it is related to reversibility as well. It could be argued that any advantages that soldiers have from HE necessarily creates a disadvantage for other soldiers. Although there is truth to such an argument, the same can be said for any relative or positional advantage that individuals have over each other in general. Moreover, the military already operates under the auspices of paternalism and it is understood that while all soldiers have inherent dignity as a human person there are positional inequalities and therefore some degree of this is to be expected and tolerated, arguably more so than in the civilian realm. Take for example different units such as the infantry or Special Forces which already receive more advanced warfighting equipment by the nature of their work over other units, such as logistics, which often perform a role that is more supportive in nature.

Garcia and Sandler make interesting points in regards to HE and distributive justice as well. They note that although HE technologies may not be inherently unjust, they are still likely to impair justice rather than promote it. “There are pre-existing unjust inequalities that are likely to result in unjust disparities in access to [HE] technologies. [HE] technologies are likely to perpetuate or increase these inequalities, given the advantages they would provide with respect to

competitive and positional goods."[20] HE use in the military would likely avoid the large scale disparities that these authors refer to here because their use in the military would be on a much smaller scale. Moreover, as noted there already exists the assumption that Special Operations units will receive and field-test newer and more technologically advanced equipment and have access to more beneficial training aids than conventional military units. In regards to HE being used on a small-scale in the military, Lin notes that, "One solution would be to confine enhancements to a small, elite force. As both an investment in and potential benefit to the individual warfighters, it is reasonable to treat them differently from the unenhanced….On the other hand, preferential treatment to any particular group could lower overall troop morale."[21]

Related to this discussion, the presumably high cost that these HE will demand in the civilian realm are not likely to be covered under health coverage as they would be considered therapeutic. Thus, initially the rich might be the only individuals who have access to them. This distributive justice scenario would be avoided as well by only permitting the military to utilize specific HE. Of course, one could make the argument that the cost of HE will inevitably come down in price and make them more accessible. Garcia and Sandler respond to this argument by noting that 2.7 billion people in the world live on less than $2/day and 1.1 billion on less than $1/day. The reality is that even if the cost of HE comes down for use in the civilian realm, most will still be unable to afford it, further creating social injustices.[22] Chatterjee is not overly concerned with these types of ethical issues in the future because, "We tacitly accept wide disparities in modifiers of cognition, as demonstrated by the acceptance of inequalities in education, nutrition, and shelter."[23] Thus he argues that these disparities would not grow any greater than they currently are in society already.

The Presidential Commission for the Study of Bioethical Issues' report entitled *Gray Matters* is also concerned with distributive justice and the use of HE in the civilian realm. The report notes that, "The nonpositional individual and societal benefits of neural modification support pursuing modifications collectively, rather than limiting access to a privileged few."[24] Mehlman echoes a similar sentiment that if HE were to become widespread and not used for societal benefits then HE might be viewed as invasions of privacy and backlash from the populace might ensue. He notes, "From an era in which employees are tested to make sure they aren't taking drugs, we might see a new approach in which employers test them to make sure they are."[25] Presumably this type of approach could also be used in the military in a more effective manner. For example, under rigorous safety guidelines, HE use in the military would avoid many of these types of concerns because they would be on a smaller scale. Similarly, as Parashar and Moreno point out, "The public may be more willing to tolerate questionable or non-validated technologies if they appear to provide any advantage over an adversary."[26] However, Lin and colleagues call for caution because of justice concerns in this regard. They note, "Caution should be exercised in policy choices that create class divisions—for instance, special treatment or different rewards—within a military, to the extent they cause dissension in the ranks."[27]

O'Brolchain and Gordijn make a powerful case that permitting HE in the civilian realm might cause harm to future generations, especially in regards to germ line engineering. They note,

> "We are either (1) causing indirect harm to future generations by using HET [human enhancement technologies] in the knowledge that they will increase inequalities and thus negatively affect the lives of future generations; (2) failing to prevent indirect harms to future

generations by allowing the use of HET to increase inequality; or (3) failing to benefit future generations by allowing the use of HET to increase inequality."[28]

O'Brolchain and Gordijn have also introduced the "*exclusion argument"* into the HE debate whereby developing nations are excluded from reaping the potential benefits from HET. They note, "Globally, an enhancement divide would become apparent between nations. Affluent nations will have far greater access to HET than all but a very small minority in the developing world."[29] These are persuasive arguments and all the more give credence to the argument that HE in the military would allow greater control and overcome many ELSI concerns. Whether or not, at another point in the future, leaders wish to engage society and permit certain HE to be introduced into the civilian realm is a separate argument. Here the focus is on the benefits of introducing HE in the military in comparison to the civilian realm.

Some scholars have suggested a research moratorium on HE until ELSI concerns can be addressed more thoroughly. Yet a research moratorium does not appear realistic given the large financial expenditures that the United States is currently investing in HE research through DARPA. Wolfendale is in partial agreement on this point but she argues that HE in the military would likely entail widespread use rather than the small-scale model that this dissertation proposes. She notes, "Yet it is difficult to imagine a military force spending considerable time and resources researching, testing, and stockpiling such enhancements and yet only using them in extremely rare cases."[30] Wolfendale has a valid point and it would be conjecture as to how strategic planners of national security plan to utilize HE in the military. Nonetheless, this does not weaken the argument that HE, should they be morally permissible, would still be more appropriately used on a smaller scale with elite forces rather than widespread use across the ranks. Here of course, the *type*, *degree*, and *context* of the HE technology would be important.

This is especially true given that the nature of warfare is shifting from large scale battles to asymmetrical warfare as was highlighted in chapter two.

A research moratorium may also have the opposite effect of driving research underground and allowing rogue nations or terrorist organizations to acquire the technology before the U.S. or any of its allies. Thus, the military once again seems to be the least problematic medium to harmonize this gap. Agreements about the military affect whole populations and citizens of democratic nations understand the sacrifice that members of the military make. Leaders and the general public may be more likely to approve of the usefulness of HE in the military if they can be shown to gain the strategic advantage over adversaries and especially if they result in fewer lives lost during warfare. Nonetheless, these concerns must be balanced with safety concerns and a host of other ELSI including upholding the human dignity of the soldier.

B. Uphold Moral Agency and Military Values

Anderson and Tollefsen have noted, "The prospect of a world in which everyone acts morally is only a promising prospect if it is genuinely a world in which everyone truly *acts*."[31] This can be applied to the use of HE in the military as well by arguing that it is imperative that moral agency and military values are upheld as these are part of the moral fabric of society in general and military culture specifically. Moreover, they allow the U.S. to be able to maintain an all-volunteer force at the current time. Future recruits who determine that HE in the military may undermine their moral agency would be less likely to volunteer and might see themselves as mere chess pawns being moved at the whim of the nation. This has ramifications for the integrity of the nation as well. The nation may be viewed in a negative light if the dignity of the soldier is

undermined and they knowingly resorted to the use of such tactics. As Dinniss and Kleffner note, "A State considering the use of enhanced soldiers must also consider its responsibility for the acts of its organs under the doctrine of State responsibility."[32]

To this extent, it would be appropriate to note that HE should be used for legitimate military ends. Ends that are not in line with the JWT, international law, human rights or that undermine human dignity would be morally impermissible. For example, the use of HE to conquer a nation for the sole purpose of annexing their land even though that nation has neither harmed nor threatened anyone, would be morally impermissible. Legitimate military ends and the notion of necessity are ambiguous terms as the JWT discussion in chapter two pointed out. To that end, Lin and colleagues argue that if "Military necessity may not be clear cut….and reasonable minds may disagree on when it exists."[33]

i. Moral Agency and Personal Responsibility

The *Gray Matters* report notes that, "Moral agents are individuals capable of acting freely and making judgments for which they can be praised, blamed, or held responsible. Respect for human dignity has grounded longstanding ethical prohibitions against coerced uses of drugs and devices to alter the brain and nervous system."[34] This statement is valuable when applied to a military context where the use of HE, such as BMI and *Propranolol*, are being debated. Upholding moral agency throughout the use of HE in the military is important because it is an integral part of what defines the human person. HE that interfere with judgment or the sense of moral duty would be harmful not only to soldiers but potentially innocent civilians as well, who might fall victim to the actions of these types of soldiers in a combat zone. Tracey and Flower have correctly pointed out that moral agency would need to be discussed on a sliding scale of

sorts as well because although HE might not completely undermine moral agency, "some psychomotor stimulants used in military medicine may also induce 'overconfident' assessment's of one's abilities."[35] Thus concepts like 'overconfident' vs. 'irrational' would need to be adequately addressed as well to determine when a soldier would no longer be a moral agent.

Along these lines Dinniss and Kleffner have pointed out that, "The illegal act committed by the enhanced soldier might not be an internationally wrongful act because of the circumstance of his or her enhancement….If the enhancement technology under consideration has destroyed the individual's capacity to form the requisite intent"[36] Russo, addressing the specific issue of the use of CE in the military, notes that their use could have a negative impact on the "ability of the military to maintain discipline, the national interests if soldiers perform atrocities attributed to pharmacologically altered minds, and potentially could undermine the Uniform Code of Military Justice if defense attorney's successfully argue that enhanced soldiers cannot be held responsible for their actions."[37]

Here it will be helpful to refer to Wolfendale who succinctly gets to the heart of the matter of agency and makes two powerful arguments as to why HE technologies in the military that undermine responsibility would be morally impermissible,

> "First, military personnel must be morally responsible agents in order to fulfill the military's ethical commitments and the requirements of military justice—the ideal of the good war fighter involves not only technical skills but also moral virtue. Technologies that undermined a combatant's moral responsibility would thereby undermine the military's claim to be a morally justified profession committed to the law of war. Second, moral responsibility is necessary for the maintenance of personal integrity and the experience of the moral emotions of guilt and remorse….Performance-enhancing technologies that compromised the moral

responsibility of military personnel would therefore undermine their integrity and the likelihood that they would experience guilt and remorse about their actions."[38]

Ashcroft notes that there are three major obstacles that must be overcome in order for HE in the military to be effectively regulated. First he notes that militaries are likely not willing to forego the tactical and strategic advantages that HE will provide. Second, HE are already becoming part of the strategic plan for future warfare, thus militaries are not likely to separate them from future conflicts given the financial resources that are already being invested in their use. Finally, international law and military discipline are not sufficiently equipped to regulate HE in the military as opposed to acts that violate any of the *Jus in Bello* and *Jus ad Bellum* international humanitarian laws that already exist.[39] This latter point is especially poignant for chapter six that shall offer some recommendations for an international treaty on the use of HE in the military that, amongst other things, upholds moral agency.

ii. Military Values and Virtues

As chapter two pointed out, cultivation of virtues is critical in the military. Virtues are states of being, and do not exist as a passing action done on a whim or only occasionally. They are habitual and deliberate practices that involve a conscious decision. The general population often views the U.S. military and its soldiers as synonymous with certain values and virtues such as courage and honor. Due to the fact that these play a large part in military culture, it goes without saying that HE that alter or modify any particular behavioral traits in soldiers will have an impact on the proper cultivation of virtues. As the U.S. Naval Academy's 2010 McCain Conference noted, "otherwise-beneficial physical and mental enhancements attained artificially, divorced from any individual investment in strenuous effort or rigorous training, may have adverse effects on individual character."[40]

Soldiers who undergo HE should be granted no special awards or honors either for their participation in the research phase or in the implementation of HE. Recall chapter two's discussion on military culture and military values here again. Forbidding any incentives for undergoing HE (whether they be monetary, promotional, awards, prime duty locations, etc.) upholds the virtues of honor, courage, and selfless service by encouraging soldiers to undertake these acts for the common good and the security of the nation, not necessarily for individual gain or glory. This policy would also likely avoid many large-scale disruptions in military social culture because peers would see that soldiers who undergo HE testing or implementation are not receiving any additional benefits or favorable treatment from their superiors. Of course, some nations may not value moral agency or military culture to the extent that the United States does. Yet moral agency is an integral part of the human person regardless of culture. Respecting it and nurturing it upholds human dignity. Nations such as these that might violate human rights or undermine moral agency should be dealt with on an international level and perhaps through an international treaty, should one be created for HE use in the military. Any HE, to the extent that it undermines moral agency of individual soldiers, is ultimately an affront to human dignity and morally impermissible, even when the security of the nation is at stake. In these cases, a different morally permissible means must be used instead to defend national security.

Approaching HE from the perspective of its impact on the cultivation of virtue in the civilian realm, Sparrow acknowledges that, "it is not clear that we have any good reason to prefer the virtues associated with existing human character traits over the virtues enhanced human beings might have."[41] Buchanan agrees with this assessment and notes that utilizing virtue ethics alone to provide a philosophical argument against the use of HE is insufficient because virtue ethics fails to take into account immoral social structures in society and downplays values such

as compassion and respect.[42] Bailey is not so quick to dismiss virtue and argues that HE will not undermine virtue, in fact "biotech, nanotech, and infotech enhancements will tend to support virtue; that is, they will help enable people to be actually good."[43] Thus from Bailey's perspective, there is nothing to suggest that individuals that have undergone HE would be incapable of flourishing in their pursuit of the basic human goods such as love, art, family, and friendship.

Approaching this issue of upholding values for HE in the military from a Canadian military perspective, Michaud-Shields highlights the *Canadian Value and Ethics Code* that notes, "treating all people with respect, dignity and fairness is fundamental to our relationship with the Canadian public and contributes to a safe and healthy work environment that promotes engagement, openness and transparency."[44] These principles coincide with what other scholars have suggested as well in regards to the use of HE in the military. "Character and integrity are crucial for the proper functioning of warfighters. Both for maintaining an *espirit de corps*, and for the best military results, warfighters need to experience themselves as being part of a larger community, with a purpose that transcends themselves."[45] When soldiers see themselves as part of something greater, other values such as hard work or industriousness might come to have more meaning. As Koch notes, "Real intelligence requires…work. One may have quickness of mind and body but without the desire and will to develop it those potentials remain inactive. Potential may be nurtured but that requires a range not of genetic or chemical attributes but a social context that is nurturing."[46] Lin and colleagues follows a similar line of thinking and notes that,

> "If the enhancement leads a soldier to act in ways that contradict a cognitive grasp of what's appropriate…then the enhancement is actually an impediment to courage, in this case

promoting the contrary vice of rashness….If enhancements come to be used as a substitute for that learning process, they will actually hinder the cultivation of prudent, courageous and good soldiers"[47]

Yet caution is in order and the use of HE in the military may not necessarily undermine the value of hard work but may in fact actually work to compliment and augment it in ways that were not possible before. Thus HE that can help a soldier achieve something beyond their physical or cognitive abilities should be addressed as well. As Lin and colleagues again note, "Consider a soldier who successfully cultivates the thoughts, desires and feelings that are fitting for an excellent soldier in battle, but whose actions in the field are still hampered by automatic symptoms of alarm beyond his or her control…Such a person could be aided in courage by an enhancement that short-circuits those symptoms."[48] Approaching the issue of HE from a Thomistic perspective, Eberl makes similarly interesting claims on the moral permissibility of certain types of HE, such as pharmaceutical use, by noting that these drugs do not necessarily make an individual less industrious, rather they may in fact increase productivity.[49]

C. Voluntary Informed Consent Free of Coercion

i. Strengthening the Informed Consent Process

The informed consent process should be adapted to individual soldiers that would serve as human research subjects for HE use and implementation. Currently, the informed consent process for a soldier volunteering to be a human research subject entails a dialogue, of sorts, wherein the military physician and soldier discuss such topics as "expected risks, any anticipated therapeutic benefits, treatment options in the event of an adverse event, and the ability to opt-out of the use at any time."[50] The informed consent process for civilians volunteering as human research subjects in DARPA HE initiatives would need to be different for soldiers because as

this dissertation has pointed out civilians enjoy greater rights and are less vulnerable to coercion or manipulation than soldiers, especially in a paternalistic system such as the military. It would also be beneficial if physicians thoroughly understood a soldier's maturity level, intelligence, social background, and any other relevant aspects of their lifestyle. This type of approach would undoubtedly be cumbersome and may be criticized for being excessively burdensome. However, it must be remembered that HE in the military would be the exception and not the rule. Thus, informed consent would be easier to achieve on a smaller scale with fewer soldiers. In fact, it may lead to a greater appreciation of informed consent given that more time could be devoted to the process in contrast to HE being given to large numbers of soldiers. Ultimately, in the absence of satisfactory evidence that shows such HE are safe, it would be prudent to error on the side of caution and deliberate the informed consent process, rather than act prematurely even if national security is at stake. Upholding human dignity demands this type of cautious and meticulous approach.

Pragmatically, this type of approach is useful because soldiers come from a wide variety of unique demographic backgrounds. For example, recent statistics show that over half of military members are married and nearly 40% are age 25 or younger.[51] Researchers and military physicians approaching a potential volunteer with this type of profile should take into consideration that the soldier is likely to be in their initial enlistment contract in the military and may still be subject to coercion by their superiors. In contrast, researchers approaching a career soldier that is over 40 years old (who make up 12% of the military population) would not need to be as suspect of coercive influences from superiors and might instead focus more so on impacts to family life or issues of reintegration back into civilian life if the soldier is nearing retirement.

Another suggestion that seems prudent is the mandatory use of independent monitors in the informed consent process to ensure that military physicians do not overstep their bounds. As the discussion in chapter three on the use of investigational drugs in the military highlighted, the DoD may violate patient autonomy at times for the sake of national security. Here it is important to make the distinction between informed consent in research trials for HE use in the military as opposed to informed consent during combat operations where HE may be mandatory and patient autonomy overridden by national security concerns. In the latter case, the U.S. military has a more powerful legal argument to the mandatory implementation of HE in the military should they be deemed necessary for national security. In the former case, there is no such precedent for volunteers during research trials and thus the informed consent process should be respected. In the case of the informed consent process for research trials of HE, there is still however the possibility that soldiers who refuse to volunteer and participate would be subject to reprisals from military superiors. Some scholars have suggested that policies involving more severe sanctions might serve as a deterrent to superiors and researchers attempting to force soldiers into participating. For example, Parasidis has noted that, "Stiff penalties for retaliatory actions would further serve to incentivize superior officers against punishing service members who elect not to participate in experimental studies…"[52]

The U.S. Army Medical Research and Materiel Command currently oversees all human research volunteers for the U.S. Army, conducts weekly briefings with them, and permits soldiers to participate or withdraw from any training program at any time without question.[53, 54] Parasidis has rightly pointed out that this approach "promotes military research endeavors and adheres to fundamental notions of patient autonomy and human dignity."[55] However, individuals who may be human research subjects often might have a consent capacity that is "impaired,

fluctuating, or in question."[56] This might particularly be the case with military personnel who struggle with issues such as traumatic brain injuries (TBI) from an IED blast. Researchers should utilize extra caution in obtaining permission from these soldiers to volunteer and participate in human subject research.

Army Regulation (AR) 40-38 entitled, *Command Directed Behavioral Health Evaluations* and AR 70-25 entitled, *Clinical Investigation Program* stipulate that soldiers direct line leadership and commanders may not be present in the room while the informed consent process is being conducted.[57, 58] Similarly, depending on the institutional review board's (IRB) approval stipulations, an ombudsmen may be present as in independent observer in the room during the informed consent process as well. McManus and colleagues have noted that this type of approach is beneficial to soldiers. Lower enlisted soldiers that are new to the military may confuse a command from leadership as a lawful order, with their autonomous choice during the informed consent process. The soldier should be entirely free to choose without elements of coercion and undue influence.[59] Robbins' commentary is also helpful here, "Cultural pressure could put service members in a constrained situation; one in which a person feels controlled by the restrictions of the situation rather than by the threat of another person."[60] This is related to the *Belmont Report* which distinguishes coercion from undue influence in this way,

> "Coercion occurs when an overt threat of harm is intentionally presented by one person to another in order to obtain compliance. Undue influence, by contrast, occurs through an offer of excessive, unwarranted, inappropriate or improper reward or other overture in order to obtain compliance."[61]

Based upon the definitions of the *Belmont Report* and the comments from Robbins, it could once again be argued that soldiers should be considered a vulnerable population. However,

even if this designation became federal policy, it should not eliminate soldiers from becoming human research subjects altogether. Rather, it would only provide more protections for soldiers as subjects of human research. At this point in this discussion, it is fair and appropriate to question *if* soldiers can ever truly provide voluntary informed consent given the elements of coercion, undue influence, and paternalism that exist in the military. Frisina answers in the affirmative and argues that soldiers should be permitted to partake in research because, "Is it necessarily true that simply because the military is inherently coercive that soldiers lose their autonomy and hence the ability to provide voluntary informed consent?"[62] In fact, some soldiers see it as their patriotic duty to volunteer to partake in medical research for the sake of their country. As Frisina again notes, "participating in medical research is a matter of pride and the self-satisfaction of knowing that they are making a unique contribution to the welfare of other soldiers."[63] However, as was highlighted in chapters three and four, the informed consent process can be undermined not only from vertical pressure of superiors or commanders but also from horizontal pressure from peers. In many ways, this may be more powerful and influential than the vertical pressure that exists. Thus in this regard, soldiers should receive more education related to the ethical issues involved with the informed consent process as well.

Lin and colleagues are pessimistic that truly informed consent can be obtained under many conditions in the military given that battlefield decisions may need to be made at times at the spur of the moment. They note that, "individual consent is neither practical nor ethically or legally required in most cases [and] risks will have to be estimated more objectively."[64] The important distinction that should be made here is that this may be true for battlefield conditions but it need not be true for human subject research involving the use of HE in the military. Obtaining informed consent in combat settings highlights many ethical issues, including the

large amount of leeway that military commanders have in mandating that soldiers take pharmaceuticals or vaccinations before entering into combat zones, as the discussion in chapters three and four pointed out.

However, as Shunk has pointed out, "Do enhanced fighters have to give their consent for any type of enhancement? If so, how much consent? Can a warfighter refuse enhancement based on ethical grounds such as religious beliefs? Under what conditions will a soldier be ordered or asked to accept a risky or unproven enhancement such as an experimental vaccine?"[65] These questions show the practical value that introducing HE in the military has over their introduction into purely civilian settings. The small-scale use of HE in the military would allow for greater informed consent ahead of time and minimize the scenarios where soldiers might be mandated by commanders to take HE in combat. This discussion once again highlights the balance that is difficult to find between autonomy and military necessity. This has led Lin and colleagues to similarly note that ultimately, "the role of consent in the military must be understood as limited. Consent in the military simply cannot do the heavy ethical and legal lifting that is expected of it in civilian settings."[66]

Important to this discussion is the fact that the military is an all volunteer force. Therefore the argument can be made that soldiers implicitly agree, when they enter the military, to occasions where their autonomy will be limited. This is a reasonable expectation that would not appear to be under threat unless perhaps the draft system was mandated and put into place again, similar to that for the Vietnam War. Yet this can only be true in limited circumstances. While it is true that soldiers may be asked to lay down their lives for their country during war, soldiers do not reasonably give implicit consent to take HE at the whim of military leadership. As Lin and colleagues have pointed out, "Warfighters engaged in direct combat might be more willing to

take risky enhancements than service personnel or operators of drones and other remote weapons…This might make it necessary to protect them from voluntarily agreeing to take potentially dangerous enhancements."[67] As the discussion in chapters three and four pointed out, the case can be made for designating military personnel as a vulnerable population. Moreover, the history of using soldiers as human research subjects in the United States and globally is fraught with abuses. There are a number of impediments to truly informed consent in the military that are distinct from a purely civilian bioethical setting. These include promotions, chain of command repercussions, honors and awards, bonuses, and the inherent paternalism of the military structure.

ii. Forbidding Incentives

There should be no incentives in volunteering for HE research other than normal standard compensation that would be due to soldiers (mileage pay, meals, medical expenses related to HE, etc.). This is a reasonable approach that respects soldiers and shows appreciation for their time and service. Monetary incentives can be a powerful motivator and may lead soldiers to make decisions based upon financial interests alone. Currently, there are a number of different bonuses and incentives for enlisting or reenlisting in the Army. These include monetary bonuses anywhere from $5,000 to $150, 000 depending on the critical needs of the Army at the time and a soldier's military occupational specialty (MOS).[68] These are substantial sums of money that can be especially enticing to soldiers who are concerned about employment once they leave the military and reintegrate back into the civilian realm. If bonuses and incentives (whatever their value) are extended to soldiers volunteering to be human research subjects for HE use and applications, then there is serious danger that this undermines not only the institution of the military and its purpose but also works as an unethical enticement. If HE are to be used in the

military, they most likely would be used on the most elite soldiers that are in prime physical, cognitive, and mental condition. These soldiers would also likely have specialized skills that could produce a more lucrative career in private industries such as intelligence, defense contracting, or weapons maintenance. Similarly, any unfair promotions, awards, honors, or favoritism for the participation in HE research or implementation should also be eliminated. Thus, this approach ensures that soldiers are volunteering for other than monetary purposes and permits some of the concerns over vulnerable population to be overcome as well.

iii. Educate Superiors

Some scholars have suggested that in addition to the removal of superiors from the informed consent process, greater education and appreciation of the ethical issues surrounding informed consent should be mandated for superiors. For example, Amoroso and Wenger have argued that the most valuable approach to improving human research and informed consent in the military is to educate commanders and research investigators who oversee HE about the rights of soldiers and the informed consent process.[69] The only formal and mandatory medical ethics course available to U.S. military physicians is offered at the Uniformed Services University of the Health Sciences (USUHS).[70, 71] Daniel Messelken and Hans-Ulrich Baer offer similar medical ethics workshops and courses to military physicians all over the world through the International Committee for Military Medicine (ICMM).[72]

More such programs would strengthen medical ethics in the military and introduce physicians to many of the complex ELSI involved with HE research and implementation in the military that they might not be familiar with. In many ways this approach of educating, but not involving a soldier's chains of command is counterintuitive in the paternalistic structure of the

military. It may in fact have the effect of undermining authority and bring other reprisals unexpectedly to soldiers. The military should be on guard against such infractions and provide soldiers greater opportunities to anonymously report incidents. Soldiers must provide informed consent in a neutral setting without the fear of repercussions from leadership. This approach coupled with greater ethics education for military physicians will serve the dual purpose of providing transparency to the public and help promote democratic trust.

iv. Autonomy vs. Common Good Concerns

Claims on autonomy are powerful especially in western democratic societies. O'Brolchain and Gordijn have outlined the concept of autonomy in this manner, "autonomy suggests that so long as a person is not harming others, they are within their rights to alter their body as they see fit, for example to implant a brain-computer interface or to take mood enhancers."[73] Caplan, writing from a civilian perspective notes that, "enhancement should only be utilized if it is something that a person can choose to use or not….Enhancement technology that cannot be declined or left unused seems to impose a loss of freedom that ought not be tolerated."[74] Such approaches to autonomy and HE however must be balanced with common good concerns. These types of claims on autonomy can be difficult to overcome, however they are not absolute. There are limits on many aspects of society, such as traffic laws, firearms use, and privacy laws just to name a few. Related to this, the Presidential Commission for the Study of Bioethical Issues' report entitled, *Moral Science* highlights that common good concerns are implicit in the informed consent process as well,

> "The principle of responsible stewardship requires citizens their representatives to think and act collectively for the common good. The government, in collaboration with institutions and investigators, should focus on the importance of the process of informed consent lest the

procedures, ostensibly derived from the ethical principles, serve to obscure the values they were intended to implement."[75]

Farah has also addressed concerns regarding informed consent and autonomy with CE. If the informed consent process is not thorough then CE can have a negative impact on autonomy. She notes, "Although cognitive enhancement can be enabling, it can also limit individual freedom…For example, it is in an employer's interest to have workers with enhanced attention or the ability to work through the night periodically."[76] This type of scenario could present itself in the military as well wherein military leaders deem that a particular skill or attribute from soldiers would be beneficial to accomplish a task or mission and then mandate the HE use, such as a pharmaceutical that allows soldiers to go without sleep for extended periods of time.

Dees is also concerned with placing too much emphasis on autonomy in the HE debate. He points out, "To say exactly how and why drugs that affect our mental functions alter our view of these activities requires, of course, a rich philosophical account of identity, an account which not only includes a theory of autonomy and its limits but also respects the essential role that communities play in our lives."[77] Thus the role of autonomy should be viewed in light of common good concerns that take into consideration concepts such as community involvement, individual freedom, self identity, and the basic goods necessary for human flourishing. As Anderson and Tollefsen note, "provided they truly enhance our capacities to participate in genuinely fulfilling goods, enhancements can be, in principle, good for us…[However] the benefits that biotechnologies promise must not be bought at the expense of degrading entire classes of our fellow man."[78] Juth has also highlighted that issues of autonomy and authenticity are important in the informed consent process. He argues that as long as a HE would be chosen

autonomously, then there is no reason why the HE could not be authentic for that person as opposed to claims of cheating and inauthenticity.[79]

D. Non-HE Alternatives Exhausted

This final moral criterion of non-HE alternatives exhausted encompasses many concepts including last resort, proportionality, military necessity, and legitimate ends. Gross ties military necessity back to principles related to the JWT as discussed in chapter two by noting that, "necessity remains constrained by proportionality."[80] Using HE for a legitimate military purpose means that the purpose must be in support of the JWT principles, directed toward a legitimate operational objective, and be reasonably expected to be successful. The military should always exhaust less morally problematic alternatives prior to resorting to the use of HE. This will help ensure that the desired outcomes are proportional to the inherent risks. As Matous notes, "To be permissible, usage must be freely chosen, safe, regulated, and a last resort. Performance enhancement is also about the nature of war and how the military views the soldier. Is the soldier treated as a machine or is the soldier's dignity as a human person upheld and protected? Only in the latter case can correct moral judgments be made about performance enhancement."[81]

Russo and colleagues have pointed out that non-HE alternatives should be exhausted before permitting the use of HE in the military as well.[82, 83] As has previously been noted, the use of HE in the military should be the exception and not the rule. The argument is often put forward that the use of HE is inevitable and there will be widespread use of it. Two responses are warranted here. First, permitting them only in the military might avoid this problem as this chapter has already been highlighting. Second, even if they become widespread it may yet be prudent to regulate them or ban them as morally impermissible. This of course goes against the

argument that just because an adversary of the U.S. will inevitably have access to a particular HE, the U.S. must necessarily pursue them as well.

The ramifications of a HE arms race do not bode well for world peace and human dignity as nations are much more likely to treat their soldiers as merely ends in themselves and undermine their inherent dignity. However, even if such an arms race were to come about it should not entail that a nation must obtain a particular HE technology to gain the strategic advantage. In those situations, it can be argued that a nation should resort to an alternative means of countering the threat of a HE from an adversary. The moral high ground must always be chosen when respect for human dignity is at stake. In many ways this final moral criterion may be the most ambiguous of the four offered here in this dissertation because, just as the discussion on the JWT in chapter two pointed out, every particular instance of resorting to war is open to interpretation, especially with the rapid rise of emerging technologies. If HE become commonplace, this can set a dangerous precedent. Military and political leaders may begin to resort to their use more often and may even make them mandatory, similar to the investigational drugs discussed in chapter three under the claim of national security.

In order to more fully appreciate why exhausting non-HE alternatives is such an important criterion, a brief discussion on the means and ends used to accomplish HE is in order. To speak of the means of obtaining HE for use in the military goes beyond mere respect for soldiers and human research subjects. This includes not treating soldiers and volunteers as mere means to a desired end as well. Perhaps most importantly, the means of obtaining HE for use in the military must show respect for the truths about the human person such as inherent human dignity and inviolable moral worth and must not hinder individuals from flourishing. As Kass has pointed out, "There is an experiential and intelligible connection between means and ends."[84]

Greely and colleagues have also addressed the issue of the importance of the means and ends of obtaining and using HE from a purely civilian perspective. They note, "newer technologies such as brain stimulation and prosthetic brain chips, should be viewed in the same general category as education, good health habits, and information technology—ways that our uniquely innovative species tries to improve itself."[85] Greely and colleagues believe that autonomy should be the determining factor as to whether or not HE should be permissible. Hopkins agrees in principle that HE are morally permissible but not through an appeal to autonomy. Rather, he proposes that an "appeal to interests" is more powerful because it can overcome concerns about human nature."[86] Storey similarly criticizes the overemphasis on autonomy in the HE debate because accepting some limits may actually assist humans in enjoying the basic goods of life.[87]

Nussbaum's capability approach is also insightful on the topic of means and ends. As previously noted in chapter three, she aligns herself with a political rights approach based upon autonomy that looks to the state to guarantee respect and support for human capabilities. She notes, "Capability, not functioning, is the political goal….Citizens must be left free to determine their course after they have the capabilities."[88] Thus to undermine these capabilities is to undermine the basic human goods that permit humans to function in society. The four moral criteria as laid out in this chapter support the basic goods of the human person and thus help us flourish in a pluralistic society. Yet there is a subtle danger in any approach that prioritizes autonomy over basic human goods. More appropriately the two principles could complement each other to ensure that the basic human goods are not undermined. These basic goods include health, knowledge, aesthetic experience, and play amongst others. Both Nussbaum and Finnis are in agreement on these in principle. Their positions shall be addressed further in chapter six on the

discussion of communitarianism and the common good. Anderson and Tollefsen follow a similar line of thought and argue that enhancements must promote the basic goods of the human person rather than, "replace our agency with genetic, pharmaceutical, or mechanical alternatives."[89]

Dees offers a similar critique of autonomy in the HE debate and notes that human flourishing must be taken into serious consideration as well when determining if HE are morally permissible or not,

> "Often arguments in bioethics seek to avoid controversial claims about what contributes human flourishing on the grounds that we should not impose any one view of the good life on others. Such a view implicitly promotes the value of autonomy over the values of flourishing, and as such, it too makes substantive claims about values."[90]

E. Conclusion

In summary, this first section of chapter five has attempted to defend the four moral criteria for the use of HE in the military as practical and ethical guidelines for determining if the use of HE in the military are morally permissible. Chapter five now turns to the application of these four moral criteria to specific HE technologies to determine their moral permissibility. Similarly, this section has attempted to show that an appropriate approach to HE would be their introduction into the military on a small-scale to overcome many ELSI concerns including distributive justice and greater appreciation for the common good.

II. Application of the Four Moral Criteria

Having laid out the four moral criteria and addressed many of the ELSI concerns involved therein, this dissertation now shifts to applying them to the specific examples of BMI for CE, genetic engineering for PE, and the use of the pharmaceutical *Propranolol* for EE. As

previously noted there will be overlap between these forms but these specific examples have been chosen to minimize this overlap. Moreover, the importance of addressing each HE individually and implicitly analyzing their *type*, *degree*, and *context* as introduced in chapter two will be crucial. It would also be prudent at this point in chapter five to keep in mind a JASON report that notes, "In facing opponents with access to the most advanced technologies, we must anticipate that many, though not all, of our technological advantages will be fleeting, and effectively countered by the enemy's adaptive tactics."[91]

Garcia and Sandler provide a helpful framework on how to approach different types of HE. They note that some enhancements are *episodic* enhancements in that they persist only as long as the HE is enabled. BMI's would be this type of enhancement because they would no longer offer the advantages of the HE to soldiers once they are shut off. Other enhancements are *sustained* in that they persist for some time after the HE intervention has been completed. [92] Anabolic steroids are an extreme example of a sustained enhancement. *Propranolol* would also be a sustained enhancement in that it lasts for a short duration after the pharmaceutical has been taken. It would also be appropriate to add "permanent enhancements" to Garcia and Sandler's framework. An example might be germ line genetic engineering as this type of enhancement is permanent and passed along to subsequent offspring.

A. Brain-Machine Interface (BMI) as a Cognitive Enhancement (CE)

i. Current Use

BMI technology makes direct communication between the brain and a machine interface through electrodes connected to the nervous system either invasively or noninvasively. BMI's were first introduced in the 1970's and have made significant advances since then and could be

used not only to control prosthetics in soldiers with amputations but also potentially act as communication devices for soldiers on the battlefield.[93,94,95] The Royal Society has pointed out that individuals with injuries such as amputations "all retain a brain mechanism to generate movement intentions. All they need is a way to deliver motor commands."[96] Bakay has similarly shown that one of the main difficulties with BMI's has been the ability of neural interfaces to accurately detect and translate command signals "to affect control over computers or prostheses."[97] Kotchetkov and colleagues note that the method of delivering these motor commands involves a lengthy learning process wherein signals are identified, interpreted, and adapted to each specific individual.[98]

Many of the claims put forth for BMI are speculative in nature. As the *Opportunities in Neuroscience for Future Army Applications* report notes, "A similarly unrealistic flight of fantasy is that the weapons system of an advanced aircraft can be controlled by thinking in the language of the aircraft's designer or pilots. In general, an expectation that higher levels of cognition can be immediately comprehended by assessing a small number of neural signals is destined for disappointment."[99] Nonetheless, it is important here to address their potential application for use in the military. Theoretically, once all safety concerns were adequately addressed, there is no *prima facie* reason why BMI's would not be morally permissible.

One recent study found that a primate in North Carolina was able to transmit movement commands to a robot in Japan through a BMI. Similar research involving BMI has found success in allowing humans to accomplish simple tasks such as turning on a TV, accessing emails, and spelling words on a computer screen.[100] Another study using an implanted electrode connected to a BMI found that patients were able to perform transportation and grip functioning using a robotic arm.[101] As the Royal Society report *Brain Waves* notes, "What is truly astonishing about

these results is that years after injury-induced paralysis, normal brain activity was still present in the motor cortex that could be willfully modulated."[102] Genik and colleagues note that until recently the main goal of BMI technology was focusing on the ability to exert some degree of control over a prosthetic, robotic, or communication device.[103] However, a 2016 study surpassed expectations and found that two primates were able to use a wireless integrated system to control a robotic platform. These results could potentially open the way forward for humans with tetraplegia to utilize a similar system to achieve independent mobility.[104]

In terms of current research in the military with BMI's, DARPA is conducting extensive research that includes helping wounded soldiers with amputated arms to be able to directly control a robotic arm through neural functioning and sense feeling.[105] Other programs related to DARPA initiatives include utilizing BMI's to assist in language skills and other complex tasks.[106, 107, 108, 109, 110] DARPA's hope is that one day in the future BMI's will be able to relay images, sounds, or any other neural messages between soldiers on the battlefield and potentially control weapons systems as well.

ii. Application of Criteria

BMI's should be reversible so that soldiers can reintegrate back into society. This raises the question of whether or not a BMI that is surgically implanted through the use of nanotechnology would be morally or legally relevant. For example, there might be concerns over property rights because in the case of BMI, the implants may become a part of the identity of the soldier. A less troublesome approach would be to only utilize non-invasive neural sensors as these would be more easily reversible. Thus, helmets might be worn to eliminate the need for surgical implantation and overcome safety concerns related to blood-brain barrier infections.

Dinniss and Kleffner also voice safety concerns by noting that, “It is possible that subsequent removal of the implant may cause neurological damage if the brain is unable to reestablish its previous pathways or otherwise compensate for the loss of the technology.”[111]

If BMI’s are used in the military then potentially they could access classified information as well. Thus these technologies would be prone to theft and illegal use as well. As Mehlman and Li point out, “Just as the military legitimately prohibits public access to properly classified information and dangerous weaponry, it would be appropriate to prevent the public from gaining access to military enhancements that were overly dangerous or that were so effective that it would threaten national security if they became available to adversaries.”[112] Thus HE such as BMI’s would need strict policies in place to protect from unlawful use and potential abuse of the dual-use technology.

Shifting away from some of the legal concerns in regards to reversibility, Jebari focuses on what impacts BMI’s might have on more metaphysical concepts such as human authenticity and identity. He notes, “In a longer perspective, individualism and the very nature of interpersonal relationships may be altered as a result of BMI applications.”[113] Although these are legitimate concerns there is nothing to suggest that BMI’s in the military will necessary lead to a loss of authenticity or identity. Milleson echoes a similar sentiment to Jebari. She notes that although nanotechnology will likely provide the keys to more efficient BMI networks, caution toward their use is in order given the complexities of the human brain and the potential to radically alter our unique human identity.[114] Although distributive justice concerns might arise here as well, the preceding discussion in this chapter has shown that these concerns can be overcome by only introducing BMI’s on a small-scale to soldiers. Thus it appears that if BMI

can overcome safety concerns that its use in the military would satisfy the first criterion of reversibility.

Concerns over moral agency and undermining existing military values are relevant as well for BMI because weapon systems in the future, such as unmanned tanks, aircraft, drones, ships or even artillery could conceivably be controlled by BMI's. Schermer notes that although there are many ELSI concerns in relation to BMI, at present there is little belief that moral responsibility would be undermined because this would go against societal standards that uphold the value of responsibility. However, he does note that in the future such radical changes may come about that raise provocative questions in relation to "distribution and attribution of responsibility."[115] Eberl, taking a more extreme scenario argues that, "Certainly, if a human being were transformed into a true cybernetic organism…by means of having had a CPU chip implanted in her brain to take over some or all of her cognitive processing, then credit towards her—even her very existence—as an epistemic agent would be diminished or destroyed altogether."[116] The difficulty here would be determining at what point a BMI undermines moral agency and therefore is no longer considered morally permissible. One way to approach this issue of *degree* would be to determine if an individual utilizing a BMI still maintains the ability to flourish in life through the pursuit of the different basic human goods as highlighted earlier in this chapter.

The remoteness or removal of the soldier from the battlefield through the use of a BMI might also undermine military values and virtues such as courage and honor. However, there is nothing to suggest that the cultivation of the virtue of courage for example can only come about by *physically* being in combat or on the battlefield. If direct combat situations never present themselves and instead soldiers are able to operate from a remote location with the overall

benefit of a reduction in loss of lives, then this benefit needs to be weighed against the harm of no longer having soldiers on the battlefield (if in fact that can be termed a harm). Related to this topic is the discussion in chapter four on the potential of HE to "cheapen" warfare and thus lead to an increase in wars rather than a reduction and greater pursuit of peace. Indeed, it might be more appropriate to note that BMI's may eliminate or reduce traditional 'conceptions' of military courage, but would not necessarily undermine existing military virtue and values. Thus, BMI's appear in principle to be able to uphold moral agency and military values.

Kotchetkov and colleagues are correct to point out that, "Irrespective of the situation, any application of BMI's in humans must be conducted in accordance with the guiding principles of patient autonomy and informed consent….as espoused by the Hippocratic Oath, the Belmont Report, and the Declaration of Helsinki."[117] As this chapter has earlier pointed out, there are implicit elements of coercion and paternalism in the military that must be taken into consideration during the informed consent process. As Seigel notes, "A soldier may aim to please superiors to avoid punishment and earn a promotion. Military personnel may fear that they will not be asked to participate in particular missions if they do not receive the particular technology that is being studied."[118] Yet once again there is nothing to suggest that the informed consent process cannot be sufficiently laid out for the soldier so that they can give voluntary informed consent. Designating soldiers as a vulnerable population would also strengthen the argument by providing additional protections.

The final moral criterion of non-HE alternatives exhausted is difficult to apply to the case of BMI because theoretically BMI may one day be the most efficient technology available to accomplish the mission. Yet given the serious danger of undermining human dignity and using soldiers as means to an end in the application of HE in the military, the burden of proof should

always be in favor of using an alternate means until necessity can be proven otherwise. For example, in the current state of the technology drone operators can operate remotely from locations all over the world without any of the ELSI concerns that BMI's in the military carry with them. Research can still be justified in the use of BMI's but the burden of proof will be to prove that there is not an alternative to BMI available that can similarly accomplish the essential task. As the *Emerging Cognitive Neuroscience and Related Technologies* report makes clear, "Even if this range of performance were found to be feasible, it would remain to be demonstrated that BMIs are superior to conventional methods for controlling computing functions and robotic vehicles."[119]

However, in theory there may be scenarios where BMI's would benefit the soldier, such as in hostile urban settings between buildings or compounds. As Krishnan notes, "The potential advantage of [BMI]-controlled weapons is that they could immerse soldiers better in the battlespace when remotely controlling an unmanned system for better situational awareness."[120] Yet Krishnan's presumption here is suspect, is it the case that military leaders would necessarily want soldiers "immersed in the battlespace"? Or might they find the prospect of soldiers *removed* from the battlefield as more effective?

Evans argues that BMI's (Human Assisted Neural Devices (HAND's)), according to the JWT and international laws of war, would be morally impermissible if they were used by soldiers to control vehicles or other robotic weapon platforms. He notes that, "In confronting a HAND, a large number of combatants can be convincingly seen to be no longer part of the larger act of war, as they are not able to attack or defend objectives in a meaningful way."[121] Evans proposes that one way HAND's might be morally permissible is if they were to carry nonlethal weapons instead.[122]

Finally, the means used to accomplish BMI and the ends for which it is used is also relevant here again. As Anderson and Tollefsen have noted, "Such implants could open up new possibilities for how humans access the world's wealth of information, and these possibilities could be for the better….[however] it is worth remembering that modern technology—even while making communication easier than ever—has led to social isolation, attention problems, and technology addictions."[123] Arguably then, BMI's could inhibit the pursuit of basic human goods and human flourishing. Yet there is no evidence to suggest that scenario will necessarily play out. Thus it appears that BMI's would be morally permissible for a use as a HE in the military as long as safety concerns are overcome and it can be definitively shown that their use cannot be accomplished by other non-HE alternative means.

B. Genetic Engineering as a Physical Enhancement (PE)

i. Current Use

Genetic engineering involves the direct manipulation of DNA to alter an organism's phenotype (characteristics) for a particular purpose. By its very nature, it is a dual-use technology. Genetic engineering works by either modifying somatic cells (those of the body) or germ line cells (those of gametes, zygotes, or early embryos). Somatic manipulation, sometimes referred to as "gene therapy," does not result in a heritable trait to offspring. Germ line manipulation however does affect future generations. While scientists have performed germ line manipulation in animals for some 25 years, there are no confirmed cases of human manipulation. It is helpful here to refer to Bess, who succinctly describes three principles that serve as the basis for genetic engineering,

> "First, some diseases are caused by malfunctions in a mere one or two genes. Fixing the gene removes the disease. Second, some intangible human traits, such as intelligence or shyness,

> are probably linked to complex systems of genes rather than isolated genes. To adopt a musical metaphor, they depend not on single notes but on chords or even symphonies. Third, by altering individual components in certain systems of genes, we can directly affect complex and intangible traits in predictable ways."[124]

Noah has also noted that with today's technology it is not yet possible to intentionally modify an adult's germ line cells and that any real breakthrough in the field for practical use in humans is still a long way off.[125] Ford and Gilmour agree but note that ethical inquiry is still important because genetic engineering is conceivable. They argue, "In the foreseeable future, the relevant military enhancement technologies are likely to be far less esoteric than genetic modification and much more akin to those seen in elite athletes."[126] Genetic engineering could potentially be used to change metabolism and improve physical capabilities, as was made apparent in chapter four's discussion on recent DARPA HE initiatives. Soldiers could be engineered to be more resistant to injury or have more desirable physical characteristics that make them more durable during war.

ii. Application of Criteria

Reversibility is a valuable moral criterion in this context because genetic interventions that might be perceived as advantageous to the current generation may in fact prove disadvantageous to future generations who find themselves in a completely different *context*. As O'Brolchain and Gordijn note, "perceived genetic disadvantages might leave us (as a species) vulnerable in unanticipated ways. For instance, the removal of a trait perceived as "undesirable" might for generations appear innocuous, but may leave future people vulnerable to the emergence of new pathogens."[127]

Distributive justice concerns are also relevant to the debate on reversibility and genetic engineering in the military. It could be argued that genetic engineering as a HE offers soldiers

positional advantages over non-enhanced citizens. Similarly, citizens might harbor feelings of resentment and discrimination might ensue. One approach could be to not inform citizens that soldiers have been genetically engineered, especially for more modest PE. This approach lacks transparency however and outcry would likely ensue once such information became public knowledge. This highlights the importance of the concepts of *type*, *degree*, and *context* again. As Resnik has pointed out, "In evaluating the ethical aspects of any particular genetic intervention, we should ask not whether it is therapy or enhancement but whether the intervention poses significant risks, offers significant benefits, violates or promotes human dignity, is just or unjust, and so on."[128] Lindsay has called for extreme caution with genetic engineering. He points out that, "Decision makers currently lack both the theoretical tools and the factual foundation for making sound judgments about the requirements of justice in a genetically transformed society. Moreover, focusing on the uncertain inequalities of the future may result in failure to give priority to more pressing inequalities of the present."[129]

Thus, based on the preceding discussion it appears that genetic engineering as a form of PE does not pass the moral criterion of reversibility because it results in a permanent HE. This says nothing about the moral permissibility of genetic engineering for therapeutic purposes (if such a distinction can be accurately made) which in theory need not be subject to the reversibility requirement.

There is scant evidence to suggest that genetic engineering as a form of PE in the military would necessarily undermine moral agency. It may however undermine military values and virtues such as courage, honor, hard work, and integrity. Conversely, soldiers who undergo a genetic PE might argue that the PE actually increases and augments their physical characteristics

rather than replace them. Thus, forms of exercise and physically demanding work must still be performed, but efficiency and work productivity would subsequently increase.

Sandel however, offers this caution to genetic enhancement,

> "It is sometimes thought that genetic enhancement erodes human responsibility by overriding effort and striving. But the real problem is the explosion, not the erosion, of responsibility. As humility gives way, responsibility expands to daunting proportions. We attribute less to chance and more to choice."[130]

Herissone-Kelly, approaching genetic engineering from a Habermasian perspective argues that "actions for which we are fully responsible must proceed from capacities that are grown, rather than made." Thus individuals that choose genetic enhancements to increase capacities are not fully responsible for their acts because they are "not wholly chosen" and pursued.[131] This is an interesting metaphysical argument against the use of genetic engineering as a PE. However, as previously noted genetic engineering could be used to augment rather than completely override values such as hard work and thus potentially increase human flourishing as well. It appears then that genetic engineering can in fact uphold moral agency and existing military values. Admittedly though, this is an extremely hard distinction to make. In order to more accurately and fairly assess the PE, the particular *type*, *degree*, and *context* would likely be the morally determinative factor.

Once safety concerns are met, obtaining informed consent would not be excessively problematic either because, as the discussion on BMI pointed out, informed consent concerns could be overcome with greater protections and the designation of military personnel as a vulnerable population. Related to informed consent is the emphasis that individuals often place on autonomy at the expense of the common good in debates over genetic engineering. A number

of scholars share these types of concerns as well. For example, Hoedemaekers, Gordijn, and Pijnenburg argue that genetic interventions "which aims to develop new (or more effective) interventions for diseases which seriously impair individual autonomous and social functioning will contribute to the common good."[132] These same scholars similarly argue in another paper that "solidarity and justice can be used to justify forms of diminished individual control over personal data and bio-samples."[133] Thus a powerful argument has been made for a balance between autonomy and the common good.

This argument is likely to resonate with members of the military as well given the deep sense of connection that exists amongst soldiers. In particular, this might be an especially relevant point when seeking members of the military to volunteer for genomic research. Members of the military have a great sense of community and commitment to the common good, given the nature of their work as defenders of a nation. Military training similarly emphasizes teamwork and camaraderie amongst soldiers. Thus strengthening social bonds amongst soldiers could give them a greater appreciation for the role of the common good as complimentary to that of autonomy and individualism. This topic is also a related concern for Tauer who argues that solidarity with all human beings, a fair distribution of the goods and benefits of genetic discoveries, and a preferential option for the poor and genetically vulnerable must be guiding principles in any policy governing genetic engineering.[134] Following a similar line of reasoning, Selgelid has pointed out that, "Legally speaking, liberty should not have absolute priority over both equality and utility. Commonly accepted social policies require sacrifice of individual liberties in order to promote the good of society…it may be unjust to pursue [HE] research while so many people do not even have their most basic medical needs met."[135]

Once again the moral criterion of non-HE being exhausted can be problematic in the context of genetic engineering as a PE. A discussion on the means and ends of genetic engineering is appropriate here again to determine whether or not they contribute to human flourishing. As was pointed out in chapter three, Finnis and Nussbaum both emphasize health as essential for human flourishing and cognitive development. Thus it could be argued that examples such as increased muscle strength, greater lung capacity, and greater immune responsiveness might be permissible as long they would be used to increase human flourishing. Yet, it could alternatively be argued that the military would be using genetic engineering for competitive means as a way to gain advantage over an adversary and thus motivations might not be oriented toward greater human flourishing.

Fenton and Nussbaum also have valuable insight to offer here. Fenton notes that, "The conditions for a full and flourishing human life could change as genetic technology proliferates."[136] Nussbaum, while laying out the capabilities necessary for a fully human life, also claims that the capabilities are 'open-ended' and therefore could evolve.[137] Fenton goes on to highlight that, "none of these capabilities (bodily health, imagination, emotion, practical reason, friendship, etc.) are in fact threatened by enhanced intelligence or athleticism."[138] Thus for Fenton and Nussbaum, genetic engineering does not necessarily undermine human flourishing, especially in light of the fact that Nussbaum believes the basic capabilities are subject to change in the future. In a similar vein, Cooke points out that by using Amartya Sen's capability theory, germ line engineering could be used to bring people up to a higher level of basic human capabilities, thereby increasing freedom among classes of people that lack it. She notes that germ line engineering should be permitted "for those interventions that promise a clear and predictable increase in *physical* capabilities only….The problem with attempting to improve

people's social capabilities with physical enhancements, or to cure social inequalities with germ line engineering, is that many enhancements are too open to social interpretation."[139] Thus these authors highlight that in theory some forms of genetic engineering, as long as they respect the basic capabilities and contribute to human flourishing, could be morally permissible.

In the context of the military as a PE however, genetic engineering fails to uphold all the four moral criteria that this chapter has laid out. Most importantly, it fails in its ability to be reversible for the reasons highlighted above. In theory however, it may be morally permissible as a therapeutic intervention. Similarly, genetic engineering as a PE would need to show that other non-HE alternatives cannot accomplish the same tasks. Finally, genetic engineering might have a difficult time proving military necessity over mere convenience.

C. Propranolol and Post-Traumatic Stress Disorder (PTSD) (EE)

i. Current Use

Farah and Wolpe note that "the brain is the organ of mind and consciousness."[140] This is an appropriate starting point for discussing the use of *Propranolol* as an EE for use in the military because it highlights many of the ELSI that are at stake. Hall and Carter have pointed out that *Propranolol* has been shown to "reduce the severity of psychological reactions to trauma and thereby reduce the risks of developing PTSD."[141] It should be noted that *Propranolol* does not erase memories *per se*, rather it allows the brain to detach the strong and emotional responses to memories that can be painful. Milliken and colleagues have shown that PTSD does not always reveal itself symptomatically after a traumatic event and may actually lay dormant for years until it is unexpectedly triggered. One study of 2,000 soldiers returning from Iraq and Afghanistan found that 18.5% of them met the criteria for PTSD, depression or a combination of both.[142]

Another study showed that soldiers reported a higher rate of PTSD on health assessments six months after they had returned from combat.[143] This reality often complicates and prevents a timely diagnosis of PTSD.

On a practical level, the treatment of PTSD with *Propranolol* is only on average around $225 per year. In comparison, the average cost of treatment for soldiers in counseling for PTSD can cost upwards of $10,000 per year. Thus there may be financial incentives to prescribing *Propranolol* as well.[144] From a distributive justice standpoint, Henry agrees and notes that, "When compared with the potential costs of hours of psychotherapy and chronic treatment with pharmacological agents such as antidepressants, the financial benefit of prophylaxis with [*Propranolol*] is clear."[145]

Currently, there is no accurate predictor for determining which soldiers have the resiliency necessary to overcome the non-physical wounds of war. However, one recent study noted that researchers found genetic markers that are linked to PTSD.[146] Thus, genetic screening could be an appropriate approach in the future to determining which soldiers might be genetically disposed to PTSD or that might have other related chemical imbalances.[147] A JASON report argues that the U.S. should collect the complete genome sequence for all military personnel to be used for such purposes.[148] Berryessa and Cho note that there are both positive and negative results that can come from genetic screening. On the one hand, the technique can be used to study genetic links to areas such as PTSD, suicidal behavior, and mental resilience. On the other hand, given the limited autonomy that soldiers possess while in the military, the results of such screening could be used to discriminate against soldiers as well."[149]

Howe has suggested,

> "Performing genetic screening on soldiers and excluding some from combat on the basis of their results could, however, violate soldiers' privacy and equality by requiring other soldiers to take disproportionate risks. Both concerns would also be more ethically problematic because the extent to which more genetically vulnerable soldiers would be likely to experience combat fatigue is uncertain."[150]

ii. Application of Criteria

Propranolol may help soldiers who are suffering from PTSD to reintegrate back into society. However, many scholars have shown that some emotional memories play vital roles in moral development and healing, especially for soldiers returning from combat.[151, 152] If soldiers have a difficult time reintegrating, than this social rejection can also lead to a triggering of PTSD. As Kamienski points out, "Homecoming soldiers suffer because there is always a huge gap between the truth about war, which they know, and society's delusions about it."[153] This can often result in unfair stigmatization, which in turn can lead to feelings of helplessness and abandonment.[154]

Casey is also concerned with issues of discrimination and stigmatization and notes that nearly half of the soldiers in Iraq believed that they would be treated differently by unit leaders if they sought treatment for behavioral health issues. Similarly, 34% felt that seeking such treatment would harm their careers, nearly 40% believed their leaders would blame them for the problem, and over 50% believed that they would be viewed as weak by their peers and leaders if they sought treatment for a behavioral health issue.[155] The personal example of Capps is appropriate here as well and summarizes many of the criticisms that can be levied against military culture for perpetuating the stigmatization of behavioral health issues. "Reducing the

stigma attached to mental health issues is critical to getting more soldiers in for treatment. When soldiers see others ridiculed and accused of malingering or of cowardice, they don't seek the help they need. This isn't a policy problem, it's a leadership problem."[156]

Authenticity concerns are another type of ELSI that have been raised in the debate over the use of *Propranolol* for the treatment of PTSD. DeGrazia believes that pharmaceuticals such as *Propranolol* can help individuals find deeper meaning and fortify their sense of identity and authenticity.[157] Bostrom and Roache are concerned with authenticity as well and highlight the complexities involved therein,

> "It seems possible that in some cases the use of drugs can help a person live more authentically. At the same time, however, we can conceive of cases in which drug induced emotions would undermine authenticity. Sometimes it seems important that our emotions respond to life events in appropriate ways. We may want to be the kind of person who would feel deep sadness at the loss of a loved one; and if the loss should occur, we want to experience grief. A person who used pills to disconnect her emotional life completely from what happened to her and to the people she cared about could plausibly be said to have disabled a very important part of her humanity."[158]

For soldiers who are suffering from PTSD, *Propranolol* is reversible in the sense that a soldier can simply stop taking the medication and its effects will wear off. On the other hand, if *Propranolol* is taken prior to a traumatic event as a preventative measure then in a sense the effects of *Propranolol* are not reversible in that the pharmaceutical has already permanently detached the emotional response to the traumatic memory. The complexities involved with the use of *Propranolol* prohibit a complete assessment as to whether or not its use would uphold the criterion of reversibility. Preliminarily however, if long-term safety concerns are met it seems

that the use of *Propranolol* satisfies the moral criterion of reversibility as a treatment but not as an enhancement that is preventative in nature.

Turning attention to the second criterion of upholding moral agency and existing military values, Kass has noted that,

> "Altering the formation of emotionally powerful memories risks severing what we remember from how we remember it and distorting the link between our perception of significant human events and the significance of the events themselves."[159]

This is a powerful metaphysical argument but the opposite practical position must be acknowledged as well. Soldiers who suffer from PTSD and depression, especially from combat, deserve the best possible treatment in the context of their respective situation. As Moreno points out, "Their concern, and that of their loved ones, is to reduce the torment of daily life."[160] Lin and colleagues note that the suppression of emotions in combat situations is risky. "With human enhancements, military organizations may elevate or diminish emotions and other psychological dispositions in their operators for some immediate benefit, but we also need to consider broader effects."[161] One such broader effect might be the possibility that soldiers will deliberately take an EE such as *Propranolol* so that they may be able to claim a diminished mental capacity as a defense to any wrongdoings that they may have committed. On this topic Donavan argues that "the use of *Propranolol* on soldiers before battle to get them to forget what they have done to others, or to make them not care would certainly be morally and ethically wrong."[162] Wolfendale elaborates further and argues against the use of *Propranolol* for the prevention of PTSD because it may alter a soldier's capacity to make rational decisions which could in turn prove devastating on the battlefield. [163] She notes that,

> "If performance-enhancing technologies undermined combatants' moral responsibility for their actions in combat, this would allow them to distance themselves from the moral implications of their participation in combat far too easily, which would hamper the moral growth and understanding that comes from the experience of emotions such as guilt and remorse. Given the moral significance of war, this consequence is deeply troubling."[164]

The preceding discussion has shown that the use of *Propranolol* as a treatment for PTSD may be warranted at times. *Propranolol* does not necessarily undermine moral agency and military values when taken as a treatment. However, the use of *Propranolol* as a preventative measure before combat is morally impermissible because it would undermine moral agency and the integrity of the fighting force.

On the criterion of informed consent, DeGrazia notes that as long as the individual is adequately informed about the risks of EE, then prohibition is not justified.[165] Similarly, Rosenberg argues that "there is no intrinsic ethical value to memories…Rather, it is for the patients to decide, via robust informed consent, what is to be done by their physicians in the successful diagnosis and treatment of their illness."[166] In the context of EE in the military there are additional concerns that soldiers suffering from PTSD or any other behavioral health issue may already have a diminished capacity to give informed consent. Moreover, they may be considered a vulnerable population especially while seeking an effective treatment plan to painful traumatic memories. Here it should be highlighted once again that additional ethics education for military physicians would help in bringing attention to ethical issues related to informed consent.

A related issue is the role that pharmaceutical companies may play in the informed consent process. Some scholars have noted that the pharmaceutical industry's interests should be probed as they may be involved in the exploitation of painful memories.[167, 168] De Jongh and

colleagues for example note that, “disease mongerers have an interest in defining as many conditions as possible as diseases” and that the current regulatory system contributes to this unethical systemic practice for the use of EE in particular.[169] Bell also notes that, “Attention to the role clinicians and researchers play in contributing to over-medicalization will lead to better understanding of how we might prevent further exploitation of a vulnerable population by the pharmaceutical industry.”[170]

The criterion of non-HE being exhausted is similarly difficult to assess in the context of the use of *Propranolol* as a treatment for PTSD. Hurley notes that emotional memories blunted by the use of *Propranolol* play an important role in the recovery of soldiers who are damaged by the experiences of combat and violence. Moreover, *Propranolol* may inhibit soldiers from achieving a “state of grace” after the terrible trauma of war.[171] Outka also stresses the values that soldiers can teach to members of society. He notes that the use of pharmaceuticals may eliminate “the symbiotic representational relationship between individual and communal trauma.” This has impacts on the notion of the common good as well because “the trauma that veterans endure after the war is carried back to the larger society, becoming a central part of the war’s subsequent history and a testimony or monument to the terrible pain and suffering that comprised the conflict. Those of us who were not there, especially, learn something invaluable from the ongoing suffering of those who were.”[172]

Warnick draws attention to research that shows there is a beneficial transformation that can accompany traumatic events referred to as post-traumatic growth (PTG). He notes that this needs to be taken into consideration when balancing the use of the *Propranolol* to treat PTSD. PTG may lead to a “greater self reliance, empathy, increased social support, increased levels of intimacy, and spiritual development.”[173] Although not related to the military, one such powerful

example of PTG here is Spicer's letter to the editor that appeared in the *New York Times* in 2004. It reads in its entirety,

> "Six years ago, I watched my teenage boys die, several hours apart, after our car was struck by a speeding patrol car. I don't mean to judge the way in which others should treat (or be treated for) their own personal tragedies. But for me, I needed to retain every detail of my memory, not only for the manslaughter trial that followed a year and a half later but also for my own well-being. I now share my experience, in vivid detail, with police officers and recruits, hoping to prevent this from happening to others. Although it's painful to relive that night and its aftermath, doing so helps me feel that I am doing something positive with this tragedy. As for erasing the memories of that night, I would never want to take a chance that even an iota of all the positive memories of my wonderful sons would disappear along with the painful ones."[174]

In regards to common good concerns and human flourishing, Seligman and Fowler point out that the four dimensions of psychological fitness for soldiers are emotional, social, family, and spiritual. They note,

> "These are the capacities that underpin human flourishing not only in the Army but in schools, corporations, and communities, and the building of these fitnesses may help define the role of the practicing psychologist of the future. The Army will rigorously ask whether building these fitnesses decreases rates of PTSD, depression, and anxiety…and helps soldiers and their families in the successful transition back to civilian employment."[175]

Ultimately, the use of *Propranolol* as a treatment for PTSD must be cautiously accepted as morally permissible in the military. However, it is not morally permissible as a preventative HE because it undermines the moral agency of soldier. Physicians should inform soldiers of the potential for PTG without the use of *Propranolol*. However, the soldier's autonomy should be respected in this regard because, although there are competing common good concerns as well, the physician-patient relationship must also be respected. Given the circumstances and the

disastrous alternatives of drug and alcohol dependency and suicidal tendencies, *Propranolol* would be an appropriate treatment at times.

Conclusion

Chapter five has integrated all of the preceding chapters and laid out an ethical defense of the four moral criteria proposed for the use of HE in the military. This dissertation adheres to this taxonomy because these criteria are well suited to address many of the ELSI concerns related to this field. ELSI concerns related to reversibility included open future, distributive justice, discrimination, authenticity, identity, and safety. ELSI concerns related to upholding moral agency and military values included issues related to JWT and the impact of HE on the cultivation of virtues and values such as courage, honor, and industriousness. ELSI concerns related to informed consent included categorizing soldiers as a vulnerable population, strengthening the informed consent process for the use of HE in the military, ethical education of superiors on the informed consent process, and forbidding incentives to soldiers who volunteer for HE research and implementation. ELSI concerns related to the final moral criterion of non-HE alternative exhausted first included last resort, military necessity, and the importance of ethically analyzing the means and ends of HE.

A similar concern was emphasis on the common good and human flourishing which shall be addressed further in chapter six. An underlying theme that was emphasized throughout this chapter was that many HE technologies would be more appropriately introduced and regulated in the military rather than in the civilian realm. One of the most powerful arguments in favor of this position was that it overcame many distributive justice and informed consent concerns. Having laid out the four moral criteria and applied them to the HE examples of BMI for CE, genetic

engineering for PE, and the use of *Propranolol* for EE, this dissertation now turns to chapter six to offer some conclusions and recommendations on how the use of HE in the military can be ethically assessed.

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Chapter Six: Conclusions and Recommendations

Conclusion

War is a terrible price to pay for the prospect of peace. Yet every nation has a moral obligation to protect its citizenry from unjust aggression of invaders. To be sure, war is always a failure. It is a failure of mankind to come together in mutual respect for the inherent dignity of the human person. The issue of the use of HE in the military is relevant today because of the rapid rise of emerging technologies. One hope that this dissertation has put forth, is that if certain HE technologies in the military can be justified as morally permissible then their use should be directed toward greater peace and a reduction of lives lost during war. The four moral criteria proposed in this dissertation can assist in this process. The old Roman military adage of "*Si vis pacem, para bellum*" or in the colloquial, "If you want peace, prepare for war" need not be true. Rather, "If you want peace, continue to work for peace" is a more noble approach.

The GWOT has altered the international approach to warfare in many ways. Large-scale warfare has been replaced by asymmetrical warfare dynamics, as the wars in Afghanistan and Iraq have come to show. This dissertation has held that HE are medical or biological interventions introduced into the body designed "to improve performance, appearance, or capability besides what is necessary to achieve, sustain, or restore health."[1] Although the distinction between enhancement and therapy can often prove elusive, this definition still offers a valuable approach to addressing the issue of HE use in the military. Predicting what warfare will look like in the future is no easy task because the state of affairs in the world is constantly in flux. Who could have predicted at the end of World Word II that nearly 50 years later the fall of communism and the Soviet Union would have come about in the manner that it did? Similarly,

although warfare should be forward seeking in preparation of expected conflicts, unpredictable events and emerging technologies will alter even the best of strategic plans. Along these same lines, who could have predicted in the early 1970's, when the field of bioethics was in its infancy, that the use of HE technologies would emerge so quickly and become part of such a contentious moral and ethical debate?

This dissertation began by outlining that the greatest asset that any military in the world has is the human person. Many emerging technologies have come to question this premise however. For example, such technologies as drones, robots, and GPS-guided ammunitions, have come to question what the future of warfare will entail and whether or not the human person will still remain a military's greatest asset. However, for as much as these technologies are becoming tools of warfare, it does not appear that they will replace the human person at any time in the near future. In fact, the growing trend, as this dissertation has pointed out, appears to be directed toward the augmentation or enhancement to create 'better' soldiers. One difficulty that has been pointed out in this dissertation is whether or not soldiers, who may have undergone a HE, can successfully integrate into the military's existing cultural framework.

Military ethics is a complex system. Although in many ways it is similar to a civilian ethical system, it still has considerable differences and places value on different objectives. Soldiers must be willing to make sacrifices for the common good of the nation. Any HE that undermines a soldier's human dignity is morally impermissible. This would include any HE that undermines a soldier's ability to be responsible and accountable for their actions both in peacetime and in war. At the same time soldiers must obey lawful orders in order for the military to maintain discipline, integrity, and a viable fighting force which is ready to protect the nation from aggression in the event of war.

Military culture seeks to promote a system of core values consisting of loyalty, duty, respect, selfless service, honor, integrity, and personal courage. When these values are undermined or neglected, there is risk that the soldier will fail in their assigned duties and put the nation and fellow soldiers at risk, especially during war. Similarly, military culture exists in part to promote the cultivation of virtues related to being a well-rounded and moral soldier. Virtues are not fleeting actions; they come about through habit and disposition directed toward basic goods and human flourishing. Some examples of military virtues include courage, wisdom, temperance, and justice. This type of virtue ethics approach has its historical roots in the works of Aristotle initially, and then later in Aquinas as well. Thus there are concerns as to what extent the use of HE in the military may undermine these values and virtues.

Paramount to military medical ethics is the physician-patient relationship that similarly exists in a civilian ethical framework. The most apparent difference between the two however, is that in a military medical ethics framework the reality of war and the necessity of preserving the fighting force may require military health care professionals to justify actions under a different set of moral principles. The physician-patient relationship during peacetime resembles that of its civilian counterpart. The relationship puts high value on the principle of autonomy in making health care decisions that are directed at the well being of soldiers so that they will be prepared to defend the nation if necessary. However, this autonomy is limited for a variety of reasons. For example, a military psychiatrist might be permitted to divulge a soldier's behavioral health records if a military commander requests it and it is related to fitness for duty concerns. Similarly, military physicians may refuse to perform procedures on soldiers that might be deemed elective in the civilian realm but would have a negative impact on soldier readiness.

Another concern related to military medical ethics is the inherent issue of dual loyalty. When physicians take an oath to their profession, they promise to look out for the best interests of their patient and to do no harm. When physicians take an oath to serve the nation through military service, this professional obligation can give rise to serious moral conflict. The use of physicians taking part in torture techniques throughout the course of the GWOT has been one recent example of this moral conflict. In reality however, this issue need not be a conflict. Torture, in all its forms is immoral and a violation of human rights and human dignity. Nonetheless, some physicians are torn as to whether or not to participate in torture. Physicians that do participate in torture view their obligation to the nation and national security as taking a higher priority than their obligation to the profession of medicine and to the good of the human person, which entails to heal and not harm. Concern arises here as well that if physicians are willing to undermine their profession for the sake of national security, might they also be willing to undermine human dignity by performing HE on soldiers under auspices of national security as well.

The topic of the JWT is also related here because ultimately the nation is seeking the use of HE in the military for how best to position themselves to gain the strategic advantage over their adversaries if war arises. Thus, many of the military's values and virtues serve as the basis for international laws of war related to the JWT, including *jus ad bellum* and *jus in bello*. The GWOT has forced the nation to take a new look at the JWT. Concepts such as combatants and non-combatants have taken on new meaning with the lack of identifiable military uniforms. The GWOT is not a nation-against-nation type of warfare; rather it appears more so directed at individuals, and occasionally states, with a particular political ideology. Yet the JWT with its principles of competent authority, just cause, right intention, probability of success, proportionality, and last resort can be enlightening for military leaders who will need to view

these concepts through a new lens if HE in the military are deemed morally permissible. One example of this would be in relation to an EE that undermined a soldier's moral agency to the extent that they were no longer responsible for their actions during warfare. This would be in violation of *jus in bello* principles against indiscriminate killing during war.

Resorting to the use of HE technologies in the military to further national objectives will often need to take into consideration of *type*, *degree*, and *context* to determine if the HE in question is morally permissible. *Types* are related to the specific HE technology in question, for example somatic genetic engineering or germ line genetic engineering. Although *degree* is difficult to determine, it is related to how much, or to what extent a particular HE alters an individual. For example, different dosages of CE such as *modafinil*, may affect what *degree* of existential changes come about in the individual. *Context* is important because, as this dissertation has argued, an appropriate medium for the use of HE might be more beneficial in the military rather than in the civilian realm. A certain HE in the military might be morally permissible for national security, but the same HE might not be appropriate for civilian use.

Related to this is an account of human nature and its role as being foundational for the principle of human dignity. The value that a nation places on human dignity in many ways is a gauge of what sorts of rights it will guarantee to its citizens, which impacts their ability to pursue basic human goods and contribute to the common good. The UDHR and UDBHR are important international documents that champion the cause of human dignity and human rights. These treaties provide protections to vulnerable populations. Moreover, elements in these treaties can be applied to the use of HE in the military as well to insure that past ethical violations on human research subjects are never repeated. Human nature is a contentious topic amongst moral philosophers. Yet a discussion on it is valuable to the subject of the proper use of HE in the

military because it can be argued that human nature is what provides the justifications for treating all individuals with inherent dignity. Here both Nussbaum and Finnis are helpful in presenting an ethical case for the importance of the basic capabilities/capacities of everyday human life. Moreover, if these are thwarted than individuals are denied their dignity and the common good is stunted. Thus, this discussion has a bearing on HE as well because it must be determined to what extent HE use in the military would deny these basic capabilities and capacities to soldiers.

This dissertation defends the position that human dignity does not vary in degree from individual to individual. Human dignity is present in all individuals by virtue of them being human. Soldiers, criminals, and terrorists all maintain inherent human dignity and it can never be removed from them. This is important in the debate over the use of HE in the military because ultimately only those techniques that respect human dignity and the truths of the person based upon human nature are morally permissible. Moreover, human dignity viewed as inherent and unchanging is less likely to be violated than conjectures of it based upon variance in degree based upon the conceptions of "value" or "dignity" that a society wants to advance to an individual. In this way, international treaties are helpful in protecting vulnerable humans from harm. It is hoped that one such treaty for HE use in the military can be created to provide guidelines on how to ethically approach the use of HE in the military. The old adage of "Lead by Example" would be helpful here for more affluent nations that have the opportunity to make a moral and political statement against the use of HE technologies that violate human dignity. Thus the positions of the bioconservatives and transhumanists are important as well because in many ways the arguments that they put forth in favor or against HE carry over to similar arguments for the use of HE in the military.

This dissertation has highlighted some of the atrocious human subject experimentations that were carried out during WWII and during the Cold War periods. Mustard gas, radiation, and psychotropic drug experiments conducted during this time frame all point to the lengths that a nation will go when there is a perceived (real or not) threat to national security. These types of human research experimentations led to the valuable ethical guidelines of the Nuremberg Code, Geneva Conventions, Declaration of Helsinki, and Belmont Report. These documents shape much of the protections that are in place today for soldiers, especially those who might volunteer to be subjects of HE research and use. The topic of soldiers being designated as a vulnerable population was also brought up throughout this dissertation. This designation under the Common Rule would serve to offer soldiers additional protections that they might need given the elements of coercion and limited autonomy that exist within the military, especially in relation to informed consent to refuse investigational drugs.

One element of military culture that can have an impact on a soldier's autonomy is paternalism. In the military, superiors have a duty to care for their subordinate soldiers. This is evident in the chain of command across all branches of the military. Superiors need to ensure that soldiers are mentally and physically prepared for war, should the need arise. On a practical level, this might entail superiors ensuring that soldiers are properly trained, have adequate resources to carry out their mission sets, and that soldiers are receiving all the proper entitlements and benefits for them and their family members. The difficulty might arise when superiors attempt to coerce their subordinates, under the guise of paternalism, to volunteer to be a human research subject for HE use in the military. One way that this dissertation has attempted to overcome this concern is by introducing HE into the military on a small-scale.

Chapter three also highlighted many of the civilian human research protections that members of the military lack. The use of investigational drugs as mandatory vaccinations on soldiers in preparation for war is one such example. Here soldiers faced reprisals for their refusal to submit. Many soldiers claimed this was a violation of the principle of informed consent because they were not given the choice to refuse. Interestingly, the AVIP is still an active requirement today for members of the military deploying to combat zones but it does not appear that it is being vigorously enforced by military health care professionals.

Emerging technologies, by their very nature, always carry with them inherent dual-use concerns. This is very much the case for HE technologies as well. The ethical role of scientists in dual-use research has been highlighted as well and may be overcome with greater ethics education for researchers to detect these concerns when they arise. However, it is important to note as well that scientists and researchers cannot reasonably be expected to discover all of the potential dual-use dilemmas of their research. Some of these concerns include the publication of scientific research that may have national security implications. One such example was the publication in 2005 of the genomic sequence of the Spanish Flu virus which killed over 20 million people between 1918 and 1919. This type of information, in the hands of a rogue nation or terrorists, could be detrimental to national security. On the other hand, respect for academic and scientific freedom to pursue research that is beneficial to humanity, such as curing diseases or infections, is also important. Related to this is the concern that potential adversaries may be pursuing HE for use in their militaries as well. One such potential adversary is the Chinese who have made their interest in HE apparent through their work with sequencing the genomes of different organisms. This coupled with the fact of their long history of human rights abuses

during human research trials points out that these types of concerns would need to be an area that an international treaty on the principles governing HE in the military addresses.

The forms of HE that were presented in this dissertation are CE, PE, and EE. These forms all have considerable overlap with one another but the demarcations are still useful in presenting a framework for how HE in the military can be approached. One such area of scientific study where all of these forms often overlap is the field of nanotechnology. Nanotechnology raises many ELSI for its dual-use potentials. One such HE that could come about through the use of nanotechnology would be in the use of nanosensors to permit military commanders to track health vitals of soldiers, such as hydration levels, blood pressure, or heart rate during combat missions. Nanotechnology could also have an impact on neuroscience through the implantation of sensors located in the brain to detect neural processes. Technologies such as fMRI, PET, NIS, tDCS, and TMS could all be used to come to a better understanding of the processes of human behavior and performance. Conversely, it has been suggested that they might be used to gather intelligence from suspected terrorists as well.

The use of pharmaceuticals by military aviators is perhaps the most well known use of CE in the U.S. military at the current time. Military aviators use such pharmaceuticals under the auspices of fatigue management. This would be an example of a CE that is rather mild in terms of *degree*. Yet the use of these CE by military aviators raises ELSI concerns related to informed consent as well. Military aviators may decline such CE, but in turn their commanders may classify them as unable to perform duties related to their jobs.

DARPA's role in the pursuit of HE for use in the military is crucial. HE initiatives being conducted and funded by DARPA include examples such as controlling soldiers' metabolism to

allow them to go extended periods of time without food in the traditional sense and preventing fatigue to enable soldiers to stay alert for extended periods of time. Of course, many of these initiatives are fraught with uncertainties and speculation. Having a proper perspective as to what are realistic possibilities of HE technologies, allows bioethicists to offer ethical insight and avoid occasions of hype.

The four criteria of (1) reversibility, (2) upholding moral agency and military values, (3) voluntary informed consent, and (4) non-HE alternatives exhausted (last resort) provide a valuable ethical framework to approach the use of HE in the military. Reversibility allows soldiers to return to civilian society and ensures they have access to an open future. Similarly, it overcomes ELSI related to authenticity and distributive justice. Introducing HE into the military on a small-scale, as the exception rather than the rule reduces the chance of their abuse. Upholding moral agency and military values ensures that HE technologies used in the military permit soldiers to take responsibility for their actions. Similarly, it maintains social stability in the military by not undermining some of the time honored virtues and values such as courage, honor, and selfless service.

Obtaining informed consent is important because the military is a paternalistic organization. Similarly, there are inherent elements of coercion within its structure and soldiers relinquish elements of their autonomy when they enter service. These concerns can be overcome with additional protections for soldiers including their designation as a vulnerable population, forbiddance of incentives, and greater ethics education for military superiors in relation to informed consent. Finally, non-HE alternatives exhausted ensures that the military only utilizes HE as a last resort when no other reasonable alternatives exist. HE in the military should be the exception, not the rule. They should be directed toward necessity and not convenience.

The application of these four moral criteria to the HE technologies of BMI, genetic engineering, and *Propranolol* all highlight that this ethical framework can be helpful to address the use of HE in the military. It was shown that the use of BMI, if they can overcome safety concerns related to reversibility, may be a morally permissible HE technique for use in the military should their use ever become feasible. Genetic engineering as a PE was unable to overcome concerns related to reversibility and non-HE alternative exhausted, thus, as presented, it would not be morally permissible. Finally, the use of *Propranolol* as an EE, while permissible for treatment of PTSD, would likely undermine the moral agency of the soldier and thus would not be morally permissible for use as a HE in the military.

Chapter six now turns to address many of the recommendations that were alluded to throughout this dissertation on how the use of HE in the military can be ethically assessed. These recommendations have been informed by the entirety of this dissertation. Moreover, they are intended to spur interest in fields that might be presently overlooked or underreported in relation to HE use in the military. There is nothing inherently novel about these recommendations and in fact many of them have been proposed by other scholars albeit often in different contexts. Ultimately, it is hoped that by viewing these recommendations from the perspective of HE use in the military, they can be utilized as an impetus for further research and similarly offer insight to professionals in the field that may have concerns regarding HE use in the military.

Recommendations

The recommendations that shall be covered here are (A) greater transparency in HE research, (B) the codification in federal policy of soldiers as a vulnerable population in human subject research, (C) greater education for military personnel in relation to ethical issues

surrounding HE research in the military, (D) the codification of universal principles into an international treaty governing the use of HE in the military, and (E) greater appreciation for the role of the "common good" and communitarian ethics as complimentary to the principles of autonomy and individualism.

A. Transparency

Transparency is a useful recommendation because it upholds the integrity of the research process and also serves the purpose of instilling greater trust of the citizenry in the work of their government. Given the numerous human rights abuses and unethical research practices that were conducted throughout the 20th century in the United States, under the auspices of national security, transparency can begin to eliminate some of the resentment that still exists from a suspect nation.

By its very nature, HE research for potential application in the military will at times contain sensitive and classified information related to national security. Thus, it will be necessary that an independent oversight board be created to deal specifically with issues related to HE use in the military. The vision is that this board would be similar to an IRB or a special ethics committee but have greater diversity amongst its members and place greater focus on ELSI.[2] This board should be comprised of professionals from a variety of related fields including scientists, legal experts, bioethicists, military personnel, government officials, members of academia, and religious leaders. This diversity of membership will help ensure that citizens trust that the board members are not violating human rights or undermining human dignity. The general public should view these individuals as honest leaders in their respective fields of expertise. Board members would need to have the proper security clearances and could be

viewed as representatives of the people. This would serve the purpose of holding cherished democratic ideals in trust when transparency is overshadowed with national security concerns. One example of a reputable academician, who served in an advisory role to the government on ethical issues related to state-sponsored human experiments, is University of Pennsylvania Professor Jonathan D. Moreno.[3] Importantly, Moreno was able to maintain a top-secret security clearance while advising the U.S. government.

Nixdorff and Bender have argued that transparency in research also serves the purpose of promoting peace, which is one of the goals of this dissertation as well. They note that researchers are integral to any meaningful peace process. "The monitoring and application of ethical decision-making rules to research are critical to the establishment of an early warning system against research that is not justified as peaceful."[4] Moreno notes that, "It is critical for the well being of our democratic society that the civilian scientific community is kept in the loop and that the rest of us can have at least a general idea of the kind of work that is being done, even though for legitimate reasons many of the details may not be generally available."[5] Lin and colleagues are in agreement and note that transparency will "help reinforce the important principle of civilian control over the military."[6]

Interestingly, DARPA seems to have already taken a step toward greater transparency in HE research. In 2014, DARPA launched a web portal that grants the public open-access to the results of their research. The program entitled, *Open Catalog* was also selected as a leading Defense Department transparency initiative.[7] Miranda and colleagues have pointed out that DARPA is willing to collaborate extensively with multi-disciplinary research teams. They note in part, "selection criteria for new [DARPA initiatives] include requirements for sharing data among DARPA-funded teams, as well as making data available to the broader scientific research

community at an accelerated pace."[8] Nelson and Tepe echo this sentiment of the value of sharing information with DARPA and other researchers in the field of HE.[9] Similarly, Chameau and colleagues note that transparency is important because "Government actions in the United States ultimately depend, legally and practically, on the consent of the governed."[10]

B. Military Personnel as a Vulnerable Population

As the discussion in chapter three regarding the use of investigational drugs on soldiers without their informed consent pointed out, it would be appropriate to designate military personnel as a vulnerable population. There are several reasons that justify this proposition. First, there are inherent elements of coercion in the military. Soldiers are required to obey lawful orders from their superiors. Even if those orders do not appear reasonable to soldiers, the presumption is in favor of the chain of command. Thus, generally speaking, unless an order is illegal or unethical, soldiers must obey it. Military culture maintains that this type of approach instills discipline and allows for the cultivation of important virtues in the soldier. If soldiers were permitted to disobey lawful orders than the entire military structure and its effectiveness would be undermined. To put it bluntly, the military needs soldiers to obey lawful orders, especially during combat. Similarly, elements of paternalism are inherent in military culture. Paternalism allows superiors to oversee subordinates' intellectual and physical development in all aspects of military life. A soldier not performing his assigned duties may in turn put the unit at risk. Thus paternalism is an integral component of ensuring that the military is prepared to defend a nation from its adversaries.

Parasidis notes that "Given the dynamics of military hierarchy, socio-economic elements, the problem of mixed agency in military medicine, and the threat of severe punitive measures,

there can be no question that service members are a class of individuals that is vulnerable to coercion and undue influence."[11] However, designating soldiers as a vulnerable population would require an amendment to the Common Rule as alluded to in chapter three. The inadequacies of the Common Rule at protecting soldiers has also been pointed out by Siegel, who notes that, "the Common Rule has been violated in previous military human research studies in that personnel could have received jail time if they did not participate."[12] Siegel is referring here to the AVIP that was undertaken by the DoD just before the beginning of the GWOT, in which soldiers were threatened with dishonorable discharges or jail time if they refused to be vaccinated. Amending the Common Rule would gain national attention as well. Thus this approach would likely increase public awareness about some of the informed consent ethical dilemmas that soldiers may be faced with in the military. Another suggested policy related to the designation of military personnel as a vulnerable population would be the imposition of penalties for any military personnel or researchers who attempt to exert undue influence or coerce a soldier into participating in research without their informed consent.

As pointed out in chapter five, the process of obtaining informed consent for participation in HE research should include an approach wherein military physicians and researchers have a greater understanding of each soldier's background so that the informed consent process can be individually tailored to them. This will ensure that soldiers have all the necessary information available to make an autonomous decision.[13] Similarly, designating soldiers as a vulnerable population could serve as an example at the international level that the U.S. respects the inherent dignity of soldiers. In turn, other nations may follow suite and approve of similar safeguards and protections for their respective soldiers.

Parasidis notes that the designation as a vulnerable population would come with significant protections for soldiers on many different levels that would likely include amendments to "military IRB protocols to require inclusion of a civilian human-subjects research expert, a retired or active duty service member with legal expertise, and mandatory use of independent consent monitors."[14] This latter suggestion of mandatory independent consent monitors would be especially valuable in that soldiers might still feel elements of coercion if a military physician is in the room attempting to obtain informed consent. Military physicians are members of the military and lawful orders from them must be obeyed as well. Thus having an independent monitor would lessen the chance for coercion or undue influence. Similarly, IRB reform in the military "could not only improve the protection of human subjects participating in military sponsored research but also create a model for civilian research and possibly a model to help facilitate military-civilian partnerships as well."[15]

C. Ethics Education

It would be beneficial if there was additional medical ethics training for military health care professionals and researchers conducting human subject research on soldiers. The United States Defense Board's recommendations entitled, *Ethical Guidelines and Practices for U.S. Military Medical Professionals* have yet to be implemented at the federal level despite being completed and presented for approval in 2015. Nonetheless, their recommendations here are worth noting. Finding #14 reads,

> "Medical ethics education and training appear to vary among Military Departments and specialties. DoD would benefit from having a common baseline education and training requirement in medical ethics across the Military Departments to ensure a consistent understanding and approach to medical ethics challenges."[16]

Similarly, Recommendation #15 reads,

> "To enhance pre-deployment and periodic field training for military health care professionals and the line command, DoD should: Ensure pre-deployment and periodic field training includes challenging medical ethics scenarios and reminders of available resources."[17]

In remains unclear how much ethical training that military health care professionals receive beyond the minimum mandatory requirements, but there is little evidence to suggest that it is extensive. As chapter five pointed out, there is currently only one mandatory medical ethics course for military health care professionals and it is offered at the Uniformed Health Sciences University in Bethesda, MD. It is remarkable that there is not more mandatory ethics education for military health care professionals. The reasons for this are unclear. It is possible that the DoD does not believe that extensive continuing-education ethics training is warranted in the military because it require too many resources. However, it may also be the case that there is a lack of qualified individuals to teach courses in medical ethics. If this is the case, and more instructors become available, then one suggestion might be to have educators travel to different bases and major DoD hospitals to conduct training throughout the year to ensure that military health care professionals receive the necessary ethics training. Ten Have suggests that there may be a shortage of educators that are qualified to teach such medical ethics courses in the United States. By extension, this may perhaps be the case in the military as well. He notes,

> "Not even half of the bioethics instructors in the USA have published a single article in bioethics. For many teachers of bioethics, this is not their primary academic focus. A survey in 2004 showed that 20% of medical schools in the US and Canada did not even fund teaching in ethics. In general, there is almost no faculty development in bioethics education. There are only a few efforts to teach the teachers and to create the next generation of bioethics instructors."[18]

The Presidential Commission for the Study of Bioethical Issues' report entitled *Gray Matters,* which studied forms of CE in the field of neuroscience, offers an ethics education recommendation that may be a valuable approach for the military to embark on as well, "Government agencies and other research funders should initiate and support research that develops innovative models and evaluates existing and new models for integrating ethics and science through education at all levels."[19]

D. Universal Principles Codified into International Law

If the ultimate goal is to eradicate war and enjoy sustained global peace, then universal principles codified into an international treaty would be a positive step in this direction. Although this type of treaty could take a variety of different forms, some suggestions are proposed here in light of the findings of this dissertation. This dissertation has argued that the overarching principle of human dignity must always be respected in the research and application of HE in the military. Thus, this principle would be an appropriate starting point for such an international treaty. From there the treaty might begin to lay out inherent truths of the human person that must be respected when utilizing HE in the military. These might include promoting basic human goods as necessary for human flourishing. This theme has been alluded to throughout chapters three and five of this dissertation as well. Next, it might be shown how some HE in principle would destroy the pursuit of these basic human goods. Here it might be appropriate to introduce some of the moral criteria presented in chapter five as guidelines for determining if a HE in the military would be morally permissible. Perhaps least controversial of these criteria would be upholding moral agency and then reversibility. These criteria would seem to garner much support of the international scene.

The application of these principles to the regulatory framework of each nation need not be universal. It would be beneficial to at least initially have nations agree on overarching principles before debating more controversial aspects of a potential treaty. Protections for research subjects would also be beneficial to have in such a treaty. Ultimately, international leaders will need to come together on this issue and draw from broad principles that diverse nation would likely agree to. The argument that some adversarial nations will not adhere to these principles should not prohibit the U.S. and its allies from taking a moral stance in favor of some form of guidelines for the use of HE in the military at the international level. Recall chapter three's discussion on the intricacies involved in getting a wide variety of diverse nations to agree to sign the *Universal Declaration of Human Rights*. In the end, there was unexpected and overwhelming success in that a wide variety of culturally diverse nations agreed to a set of declarations that to this day still carries moral worth.

Greely's description of the problems of an international ban on HE is informative here albeit from a purely civilian perspective. Nonetheless, it can enlighten an approach to a treaty on HE in the military as well,

> "Without such an international ban, countries that would like to ban an enhancement may not feel able to do so for competitive reasons. Even if they do ban the enhancements, they will then have the problem of preventing their nationals from becoming "enhancement tourists" who go outside the country to get enhancements they want. But universal bans on forms of human biological enhancements will be difficult to create and probably impossible to enforce."[20]

Ashcroft lays out four possibilities for how HE might be internationally regulated.[21] Thus it will be helpful here to analyze his suggestions and offer some comments. The first possibility he proposes is an international code on medical ethics and honor that would call for the ban of

such technologies. Ashcroft argues that such a code would be a powerful deterrent for soldiers to undergo HE and would treat combatants as equals. The second proposal that Ashcroft addresses is modifying international humanitarian law to hold commanders responsible for failure to regulate the use of HE. Commanders would be liable for war crimes should they knowingly fail to control the use of HE in their subordinates. The third proposal that Ashcroft addresses involves the modification of international bioethics norms to prevent the development and use of HE in the military. While this seems reasonable in theory and may gain modest support, not all nations will be willing to forego the enticement of HE use in the military.

The final proposal that Ashcroft addresses involves the use of international treaty obligations to help "proliferate" HE from the military. This approach is most in line with the outline that was suggested above on formulating an international treaty related to HE use in the military. Thus Ashcroft if helpful for pointing out that any type of regulation would need to come about internationally. However, in the end he believes that "The most likely regulatory approach is none at all: war is hell."[22] This dissertation takes an alternative and less pessimistic approach and argues that an international treaty may yet be possible.

E. Human Flourishing, Communitarianism, and the Common Good

As highlighted throughout this dissertation, pursuit of the basic human goods is important because it allows individuals to flourish. It is hoped that the four criteria proposed in chapter five have offered some moral insight into ethically addressing the use of HE in the military while maintaining human dignity. By utilizing this framework it is possible to see that certain HE technologies are incompatible with human flourishing. This approach is not based upon any particular rights theory *per se*, other than general human rights and human dignity, although

admittedly, the third moral criterion of informed consent does contain inherent elements of autonomy that are consistent with western democracy. An ethical approach to the use of HE that is strictly rights-based can be dangerous because it fails to address the competing notion of community. The suggestion of introducing HE into the military on a small-scale, and thereby overcoming some distributive justice concerns that would be more apparent if introduced into the civilian realm based on the principles of rights and autonomy, is similarly an attempt at showing that a proper conception of the common good is critical. Gross highlights the value of a communitarian ethic in relation to small military groups. [23] This might be helpful when considering that HE in the military should be introduced on a small scale. Similarly, Ten Have's approach to global communitarianism might have value as well when we consider the need for an international HE treaty.[24]

Advancing the common good involves taking part in the collective pursuit of those values and desires that lead to human flourishing. The common good is often viewed as opposed to autonomy and individualism. However, this approach misunderstands what the common good actually entails. As Peterson-Iyer notes, "the common good is best seen as inextricably bound up with individual good, such that the individual can truly flourish only in the context of a healthy larger community."[25] Thus, HE in the military can be seen as advancing the common good because when they are morally permissible, they are being used in service of the nation. As Gross notes, "communities build individuals just as much as individuals build communities."[26]

Similarly, it may be beneficial to approach the use of HE in the military, and in civil society in general, based upon a communitarian ethic that attempts to balance claims on autonomy with competing claims from the collective good. Hoedemaekers, Gordijn, and Pijnenburg have noted, "the communitarian model does not focus primarily on individual

medical need or common disease, but on what the community considers as medically necessary and this depends on the values and standard in a given community." [27] By extension, it would be helpful to consider what types of HE in the military are truly necessary to uphold its values and standards. Approaching the issue in this way might help reveal that certain HE technologies are neither in the interests of the military nor the common good of the nation and thus their introduction into civil society may in fact undermine basic human goods and human flourishing.

Similarly, Nussbaum and Finnis are helpful here in their presentation of the capabilities/capacities that are necessary for human flourishing. As Finnis notes, "there is a common good…and it is definite enough to exclude a considerable number of types of political arrangement, laws, etc."[28] Thus, excluding certain HE technologies from use in the military, through utilizing the moral framework presented in chapter five, might in fact promote the common good as well. Nussbaum notes that the, "The aim of public policy is the production of capabilities."[29] Thus, it would be helpful to approach HE technologies for use in the military to determine if in fact they are oriented toward producing capabilities. O'Brolchain and Gordijn are also helpful here for pointing out there are many other pressing needs that the community has that should be considered in light of the pursuit of HE technologies. They note, "a more positive conception of rights, which would only consider rights as secured when people have the relevant capabilities to use them, also has implications for the development of HET."[30]

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